SOME FEW

GENERAL REMARKS

ON FRACTURES

AND

DISLOCATIONS.

By PERCIVALL POTT, F.R.S.

AND

SURGEON to ST. BARTHOLOMEW'S-HOSPITAL.

Navem agere ignarus navis timet; abrotanum ægro
Non audet, nisi qui didicit dare. Quod medicorum est
Promittunt medici: tractant fabrilia fabri.

HORAT.

Surgeon Gen'l's
5-9213
Washington D.C.

LONDON:

Printed for L. HAWES, W. CLARKE, and R. COLLINS,
in Pater-noster Row. M.DCC.LXIX.

TO

Doctor WILLIAM PITCAIRN,

Doctor ANTHONY ASKEW,

AND

Doctor RICHARD TYSON,

PHYSICIANS

TO

St. BARTHOLOMEW'S-HOSPITAL,

The following ſheets are addreſſed as a ſmall teſtimony of the regard and eſteem of their

Sincere Friend, and

Very Humble Servant,

Percivall Pott.

ON

FRACTURES and DISLOCATIONS.

NO part of ſurgery is thought to be ſo eaſy to underſtand, as that which relates to fractures and diſlocations. Every, the moſt inexpert, and leaſt inſtructed practitioner, deems himſelf perfectly qualified to fulfil this part of the chirurgic art; and the majority, even of theſe, are affronted by an offer of inſtruction, on a ſubject with which they think themſelves already ſo well acquainted.

This is alſo the opinion of a conſiderable part of the people. They regard bone-ſetting (as it is called) as no matter of ſcience; as a thing which the moſt ignorant farrier may with the utmoſt eaſe become ſoon and perfectly maſter of; nay, that he may receive it from his father and family, as a kind of heritage. We all remember the great, though ſhort-lived reputation, of the

late Mrs. Mapp. We all remember, that even the abſurdity and impracticability of her own promiſes and engagements were by no means equal to the expectations and credulity of thoſe who ran after her, that is, of all ranks and degrees of people, from the loweſt labourer or mechanic, up to thoſe of the moſt exalted rank and ſtation; ſeveral of whom not only did not heſitate to believe implicitly the moſt extravagant aſſertions of an ignorant, illiberal, drunken female ſavage, but even ſollicited her company, and at leaſt ſeemed to enjoy her converſation.

The deſire of health and eaſe, like that of money, ſeems to put all underſtandings and all men upon a level; the avaritious are duped by every bubble, the lame and the unhealthy by every quack. Each party reſigns his underſtanding, ſwallows greedily, and for a time believes implicitly the moſt groundleſs, ill-founded and deluſory promiſes, and nothing but loſs and diſappointment ever produces conviction. Arts, trades, and manufactures are allowed to be learnt, in general, by thoſe who have employed a proper quantity of time and attention in ſuch purſuits; and it ſeems moſt ſingularly unjuſt,

unjuſt, as well as untrue, to ſuppoſe that phyſical people are the only part of mankind who are all either ſo dull as not to be able to learn, or ſo profligately wicked as not to practiſe their art to the beſt of their judgment, and to the greateſt poſſible advantage of mankind.—Surely there are, and always have been among us, as well as in all other claſſes, men truly able and perfectly honeſt; men, who well underſtand the ſcience which they profeſs, and who practiſe it, not only with great ability, but with ſtrict integrity. I cannot be ſuppoſed to ſay or to mean this as a vindication of every individual. Different men have different powers and capacities. The multitude with us, as with all ranks and degrees (not excepting any) will always be deficient. Advancements in knowledge will always be owing to the ingenuity and induſtry of a few particular people; but ſuch advancements will always, in due time, more or leſs influence the reſt. They have ſo done; and notwithſtanding that there remains a great deal yet to be done, to bring ſurgery to that degree of perfection of which it is capable, yet, whoever will compare the

preſent practice of it with that of a very few years ago, cannot juſtly or with any degree of candor, with-hold his commendation from his contemporaries.

I remember ſome years ago to have heard a judge from the bench tell a jury, that he believed a country bone-ſetter knew full as much, if not more of the matter of his own buſineſs, than any, the moſt eminent ſurgeon in the kingdom. I will not enter into a diſquiſition concerning the rightneſs of a judge's opinion. Perhaps his lordſhip might very little underſtand the thing concerning which he decided ſo peremptorily; without either injuſtice or partiality, I may certainly ſuppoſe him to have been a much more able lawyer than ſurgeon: and I believe it will alſo be allowed, that general reflections of this kind are, and muſt be, the conſequences of a petulant attempt to be witty, rather than of conviction; and therefore, at beſt, are frivolous and idle. But, on the other hand, I am very willing to allow (what indeed I have already allowed) that many parts of ſurgery are ſtill capable of conſiderable improvement; and this part perhaps, as much as, if not more than any, it being one of thoſe

in

in which a general obſervance of and rigid adherence to old preſcribed rules, have prevented the majority of practitioners from venturing to think for themſelves, and have induced them to go on in a beaten track, from which they might not only ſafely, but advantageouſly deviate.

The general doctrine relative to fractures is contained under the following heads, as parts of the treatment of them.

Extenſion.
Counter-extenſion.
Coaptation or ſetting.
Application of medicaments.
Deligation or bandage.
Poſition.
Prevention or relief of accidents.

This is the general arrangement of the ſubject by moſt of the writers on it, and a very juſt and proper one it is; but notwithſtanding the parade of books under theſe various heads, much leſs alteration will be met with, ſince the times of Hippocrates, Galen and Celſus, than an inquirer might expect, or than the ſubject is capable of.

I muſt deſire that what I have ſaid may not be miſconſtrued. I do not mean that there are not, and have not at all times been,

been, men of particular ingenuity, who have deviated from the common methods, and have greatly improved the art; but ſtill the common methods are the ſame, and the multitude of practitioners religiouſly follow them. Let me not therefore be charged with preſumption or arrogance, if I ſay, that under almoſt every of the foregoing heads the practice is capable of conſiderable improvements; improvements which would ſhow rationality and ſenſe in the ſurgeon, and produce eaſe and convenience to the patient.

I am aware that ſome of my readers may be inclined to charge we with affecting to deviate from the commonly preſcribed rules, and to contradict opinions, which a great length of time, and a long ſucceſſion of writers have given ſanction to.

——— ——— ——— "quæ
"Imberbes didicere, ſenes perdenda fateri,"

is a hard leſſon ſometimes to human vanity, and what requires ſome degree of candor to learn. But, on the other hand, if it was not now and then practiſed, I know not how ſuch an art as ſurgery (whoſe baſis is experience) could ever be improved. Our anceſtors

anceſtors deſerve our beſt thanks for the aſſiſtance which they have given us; where we find them to be right, we are obliged to embrace their opinions as truths; but implicit faith is not required from man to man, and our reverence for our predeceſſors muſt not prevent us from uſing our own judgments. Antient and modern are mere ſounds, and can ſignify nothing in this caſe, unleſs with the former we can connect an idea of truth eſtabliſhed and confirmed by time and experience, and with the latter that of demonſtrable improvement upon what has gone before.

If what I have to urge is not capable of being verified, and confirmed by experience, it muſt ſink into nothing; but if upon trial it ſhall be found by the majority, (as it has been by me and ſome others) to be not only true and practicable, but highly conducive to the eaſe and benefit of the afflicted, it ought to have as much weight, though delivered by a living writer, as if it had proceeded from the remoteſt antiquity: its uſe, not its date, ſhould give it value. If practitioners ſince the time of Albucaſis had been contented with his doctrine, and never had ventured to think for themſelves, ſur-

gery had not been what it now is, and its great merit would ſtill have conſiſted in the multiplicity of its hot irons. In ſhort, to ſuch as think that we are ſeldom or never to deviate from the opinions and practice of thoſe who have gone before us, I ſhall take the liberty of anſwering in the words of the great Mr. Locke, who ſays, "the "floating of other mens opinions in our "brains makes us not one jot the more "knowing, though they happen to be true. "And beaten tracks lead thoſe whoſe "thoughts reach only to imitation, "non "quo eundem eſt, ſed quo itur."

Before I enter on the ſubject, the reader will give me leave to acquaint him, that it is by no means my intention to write a regular treatiſe on fractures, although I think the ſubject well deſerving of, and even requiring one. I only mean to throw out a few hints, which I hope may prove intelligible and uſeful.

The firſt article in the general arrangement is extenſion; under which may alſo be comprehended the ſecond, or counter-extenſion.

In

In order to accompliſh this, we are directed, if the fracture be of the thigh or leg, to place the patient in a ſupine poſture, and the broken limb in a ſtraight one; then having the upper part of it held firm and ſteady, by proper aſſiſtants, we are ordered by means of hands, ligatures, laçs, or even in ſome caſes by pieces of machinery, to make ſuch an extenſion or ſtretching of the limb lengthways, as ſhall enable the ſurgeon to place the ends of the broken bone in as apt, that is, in as even a poſition, with regard to each other, as the nature of the fracture will admit.——This is a ſhort deſcription of what, in the vulgar phraſe, is called ſetting a broken bone, and is moſt commonly a painful operation to the patient, a fatiguing one to the operator and his aſſiſtants, and what is worſe, is in many inſtances found to be inefficacious; at leaſt, not fully to anſwer the intention of the one, or the expectation of the other *.

Writers

* "Inſtruments for extenſion are threefold; firſt, the "ſurgeons hands, &c. ſecondly, funes & habenæ, a ſort "of bandage fit to pluck at, in order for extenſion; "thirdly,

Writers in general are very preciſe and formal in the directions which they have given, for the due and proper accompliſhment of this purpoſe. They have told us, that the extenſion ſhould be made ſlowly and gradually; and ſhould be continued till the ends of the bone are ſeparated from each other ſufficiently, to admit of the fracture being ſet without riſque of breaking off any points or inequalities, and to enable us to place them perfectly ſmooth and even.

All

" thirdly, there are organa & machinemata, engines " uſed by us and invented by the ancients."

WISEMAN.

The very mention of fumes, habenæ, organa and machinemata, implies a force exceeding that of mere hands. A degree of force, which in a fracture never can be wanted, if the limb be rightly placed; a degree of force, which muſt in the nature of things do miſchief; and a degree of force, whoſe whole effect, however great, muſt ceaſe immediately upon its being removed; unleſs the fracture be particularly and luckily circumſtanced.

There are not wanting inſtances of the muſcles ſurrounding a bad though ſimple fracture having been torn by extenſion, and ſpaſm and other miſchief thereby produced. See cautions on this ſubject, laid down by many old writers, particularly by Galen and Albucaſis.

All this, like many other of the preceptive parts of phyſic and ſurgery, is very pretty on paper, but not often found to be practicable in the chamber. The direction to continue the extenſion until the ends of the bones are at a certain diſtance, lengthways from each other, plainly implies a conſiderable degree of violence; the limb muſt by ſuch force be not only made longer than its fellow, or than nature ever intended it ſhould be, but this procruſtian method of lengthening it is ordered to be executed while the limb is in ſuch poſition as to put all the muſcles moſt on the ſtretch, and render them leaſt likely to yield to it. Now, not to ſay a word of the great probability of the points and edges of the fracture wounding the ſurrounding muſcles, or of ſuch wounds being more painful or worſe in their conſequences when inflicted on parts thus ſtretched, or of the addition that ſuch force muſt make to the laceration already neceſſarily made by the fracture; I ſay, not to mention a word of all this, can the method itſelf (without conſidering any accidental adjunct circumſtances) be practiſed in every fracture, or even in the majority of fractures? Will it be done properly by the rude,

rude, the inattentive, and the ignorant? if attempted by ſuch, will it not be, is it not, frequently productive of pain, tumefaction, inflammation, and extravaſation; which are ſet to the account of the nature of the fracture, and to inevitable neceſſity? and when done ever ſo properly, will it, can it, in an oblique or ſplintered fracture, anſwer the purpoſe it is intended for, or produce a more happy coaptation?

Whence ariſe theſe evils? from whence proceed the difficulty and the ſo frequent diſappointment?

In order to underſtand this rightly, let us for a moment conſider, what is or ought to be meant by the terms extenſion and counter-extenſion, and why they become neceſſary: for if the greater part of the pain attending ſuch method, and the frequency of diſappointment, both to patient and ſurgeon, ſhould be found to ariſe from this part of the proceſs, and that ſuch part can be either diſuſed without prejudice, or altered with advantage, we ought to think ourſelves happy in having it in our power to correct our error.

Neither extenſion nor counter-extenſion can ever be neceſſary, on account of the

mere fracture, conſidered abſtractedly. The broken ends of the bone or bones are of themſelves inactive, and if not acted upon by other parts they would always remain motionleſs. When any attempt is made to put them into motion, they of themſelves can make no poſſible reſiſtance, nor can any be made on their part, ſave an accidental one ariſing from the points of the fracture being entangled with each other; and when they have been once, by the hand of the ſurgeon, placed properly and evenly with regard to each other, they would of themſelves for ever remain ſo. What then is the reaſon why fractured bones always ſuffer a greater or a leſs degree of diſplacement? why is a broken limb almoſt always ſhorter than its fellow? what creates the reſiſtance, which we always find in attempting to bring the fractured parts aptly together? whence does it proceed, that when we have done all that is in our power (according to this mode of acting) the ends of the fracture will in many caſes become again diſplaced, and lameneſs and deformity frequently enſue? In ſhort, what are the parts or powers which act on the bones, and

which

which by ſo acting on them produce all theſe conſequences?

Theſe parts are the muſcles, the only moving powers in an animal body. By the action of theſe on the bones all locomotion is performed, and cannot be performed without them: and although all bones, when broken, are in ſome degree diſplaced and ſhortened, yet it will always be found, that in proportion as the muſcles ſurrounding or in connexion with a bone are ſtrong or numerous, or put into action by inadvertence or ſpaſm, ſo will the diſplacement of the ends of ſuch bone, when fractured be. The even and ſmooth poſition of the fractured ends of a tibia, when the fibula of the ſame leg is intire and unhurt, that is, when the muſcles therefore cannot act upon the former; the viſible and immediate deformity, when both the before-mentioned bones are broken nearly in the ſame place; that is, when the muſcles can act upon and diſplace ſuch fracture; the great difficulty frequently met with, in endeavouring to get a broken os femoris, to lie even tolerably ſmooth, and to prevent ſuch broken limb from being muſt ſhorter than the other,

are,

are, among others which might be produced, ſuch ſtrong and irrefragable proofs as need no comment.

From the muſcles then, and from them only, proceeds all the difficulty which we meet with in making our extenſion, and by the reſiſtance of theſe, and of theſe only, are we prevented from being always able to put the ends of a fractured bone immediately into the moſt apt contact.

Let us in the next place conſider, what it is which gives to a muſcle, or to the principal muſcles of a limb, the greateſt power of reſiſting any force applied to them ab externo, in order to draw them out into greater length; for whatever that is, the ſame thing will be found to be the cauſe of the different degrees of reſiſtance in ſetting a fracture.

Does not the putting the muſcles in a ſtate of tenſion, or into a ſtate approaching nearly to that of tenſion, almoſt neceſſarily produce this effect? or, in other words, does not that poſition of a limb, which puts its muſcles into or nearly into ſuch a ſtate, give ſuch muſcles an opportunity of exerting their greateſt power either of action or of reſiſtance? This I believe cannot be de-

nied. On the other hand, what is the ſtate or poſition of a muſcle which is moſt likely to prevent it from acting, and to deprive it moſt of its power of reſiſtance? or what is that poſition of a limb, which in the caſe of a broken bone will moſt incapacitate the muſcles from acting on and diſplacing it, and in the greateſt degree remove that reſiſtance which they have it in their power to make to the attempts for the reduction of ſuch fracture? Is it not obvious, that putting a limb into ſuch poſition as ſhall relax the whole ſet of muſcles belonging to or in conexion with the broken bone, muſt beſt anſwer ſuch purpoſe? Nothing ſurely can be more evident: if this be granted, will it not, muſt it not follow, that ſuch poſture of a broken limb muſt be the beſt for making the reduction; that is, it muſt be that in which the muſcles will reſiſt the leaſt and be leaſt likely to be injured, that in which the broken bone will be moſt eaſily ſet, the patient ſuffer leaſt pain in preſent, and that from which future lameneſs and deformity will be leaſt likely to happen. A little attention to what frequently occurs, may perhaps ſerve to illuſtrate and confirm this doctrine better than mere aſſertion.

What

What is the reaſon why no man, however ſuperficially acquainted with his art, ever finds much trouble in ſetting a fractured os humeri, and that with very little pain, and a very ſmall degree of extenſion? Is it not becauſe both patient and ſurgeon concur in putting the arm into a ſtate of flexion; that is, into ſuch a ſtate as relaxes all the muſcles ſurrounding the broken bone? and is it not for the ſame reaſon that we ſo very ſeldom ſee (comparatively ſpeaking of this bone with others) a deformity in conſequence of a fracture of it? Let the reduction be attempted with the arm extended from the body, and the difficulty of ſetting will be much increaſed: let the arm be depoſited in an extended ſtraight poſition, and the fracture will be diſplaced and lie uneven.

Apply the ſame kind of reaſoning to the os femoris; that bone whoſe fracture ſo often lames the patient, and diſgraces the ſurgeon.

Will it not be more cogent, and more concluſive, in proportion as the muſcles in connexion with this bone are more numerous and ſtronger? I would aſk any man who has been much converſant with accidents of this kind, what is the poſture

 which

which almoſt every perſon whoſe os femoris has been newly broken puts himſelf into, in order to obtain eaſe, until he gets proper aſſiſtance? Do ſuch people ſtretch out their limb, and place their leg and thigh ſtraight, and reſting on the calf and heel? I believe ſeldom or never. On the contrary, do not ſuch people almoſt always bend their knee, and lay the broken thigh on its outſide? and is not the reaſon, why this muſt be the moſt eaſy poſture, obvious?

From want of attention to, or from not underſtanding theſe few ſelf-evident principles, many people permit their patients to ſuffer conſiderable inconvenience, both preſent and future.

It is a maxim univerſally taught and received, that a fractured limb may be in ſuch ſtate, as not to admit of the extenſion neceſſary for its being ſet; that is, if aſſiſtance be not at hand when the accident happens, if they who bring the patient home do it ſo aukwardly or rudely as to bruiſe and hurt the part, if from drunkenneſs, folly or obſtinacy in the patient, it happens that the limb is ſo diſordered that it is found to be much ſwollen, inflamed

and

and painful, it is allowed not to be in a ſtate to admit extenſion.

This, I ſay, is a general maxim, and founded upon very juſt principles; but what is the general practice in conſequence of it? It is, to place the limb in an extended, ſtraight poſition, to ſecure it in that, and then by proper means, ſuch as fomentation, pultice, &c. to endeavour to remove the tenſion and tumor. Now if it be conſidered that the ſwollen, indurated, and inflamed ſtate of the muſcles is the circumſtance which renders extenſion improper, ſurely it muſt be obvious that ſuch poſition of the limb, as neceſſarily puts theſe very muſcles in ſome degree on the ſtretch, muſt be a very improper one for the accompliſhment of what ought to be aimed at. Under this method of treatment, the ſpace of time which paſſes in the removal of the tenſion is ſometimes conſiderable, ſo conſiderable that a happy and even coaptation becomes afterwards impracticable; and then this accident, which nine times in ten is capable of immediate relief, is urged as an excuſe for unneceſſary lameneſs and deformity.

How then are we to conduct ourſelves in ſuch circumſtances? The nature of the com-

plaint points out the relief. Extenſion is wrong; a ſtraight poſition of the thigh or leg is a degree of extenſion, and a ſtill greater degree of it in proportion as the muſcles are in ſuch circumſtances as to be leſs capable of bearing it. Change of poſture then muſt be the remedy, or rather the placing the limb in ſuch manner as to relax all its muſcles, muſt be the moſt obvious and certain method of relieving all the ills ariſing from a tenſe ſtate of them: which change of poſture will be attended with another circumſtance of very great conſequence; which is, that the bones may in ſuch poſture be immediately ſet, and not one moment's time be thereby loſt; a circumſtance of great advantage indeed; for, whatever may be the popular or prevailing opinion, it is demonſtrably true, that a broken bone cannot be too ſoon put to rights; as muſt appear to every one who will for a moment conſider the neceſſary ſtate of the muſcles, tendons and membranes ſurrounding, and the medullary organs contained within a large bone broken and unſet; that is, lying in an uneven irregular manner. Can any truth be more clear, than that if the fracture, tenſion and tumefaction

mefaction be ſuch that the muſcles cannot bear to be ſtretched out in the manner neceſſary for ſetting the broken bone, without cauſing great pain, and perhaps bringing on ſtill worſe ſymptoms, the more the poſition of that limb makes its muſcles approach toward a ſtate of tenſion, the leſs likely it muſt be that ſuch ſymptoms ſhould remit, and the longer it muſt be before the wiſhed-for alteration can happen; and conſequently, that while the accompliſhment of ſuch purpoſe is by every other means aimed at, the poſition of the limb ought moſt certainly to contribute to, and not to counteract it? In ſhort, if the experiment of change of poſture be fairly and properly made, the objections to immediate reduction, from tenſion, tumour, &c. will moſt frequently be found to be groundleſs, and the fracture will be capable of being put to rights, as well at firſt as at any diſtance of time afterward.

Extenſion having been made, and the broken ends of the bone having been placed as ſmooth and as even as the nature of the caſe will admit, the next circumſtance to be attended to is the application of ſome medicament to the limb; particularly to the

fractured part of it. In this, different people act differently. Some make uſe of an adheſive, or what they chuſe to call a roborant plaſter; ſome, of what is commonly called a cere-cloth; others apply ſpirit. vini with oil, vinegar and white of egg; and others the ſpirit. mindereri, the ſolution of crude ſal ammoniac in vinegar and water, or ſome ſuch kind of medicine.

To the cere-cloth, provided it neither ſticks to the ſkin, nor is capable of irritating it, there can be no objection; neither can there be any to all the others, except the adheſive plaſter; that muſt for ever be wrong upon every rational principle. The intention in applying any kind of external medicine to a broken limb is, or ought to be, to repreſs inflammation, to diſperſe extravaſated blood, to keep the ſkin lax, moiſt and perſpirable, and at the ſame time to afford ſome though very ſmall degree of reſtraint or confinement to the fracture, but not to bind or preſs; and it ſhould alſo be calculated as much as poſſible to prevent itching, an herpetic eruption, or an eryſipelatous efflorescence. Adheſive plaſters of all kinds, let the compoſition of them be what it may, are from this one quality the leaſt

leaſt likely to contribute to any of the good ends propoſed, and the moſt likely to be the cauſe of the contrary inconveniences, which ought moſt carefully to be avoided. They obſtruct perſpiration, they heat the ſkin, they produce itching, eruption and inflammation; and if the fracture be quite ſurrounded by them, and the limb be from any cauſe ever ſo little inclined to ſwell, they make a tight, painful and pernicious ſtricture; much greater even than a roller, and leſs likely to relax. At St. Bartholomew's hoſpital we uſe a cerate made by a ſolution of lytharge in vinegar, which with ſoap, oil, and wax, is afterward formed into ſuch conſiſtence as juſt to admit being ſpread without warming.

This lies very eaſy, repels inflammation, is not adherent, comes off clean, and very ſeldom if ever irritates or cauſes either herpes or eryſipelas. But let the form and compoſition of the application made to the limb be what it may, one thing is clear, viz. that it ſhould be put on in ſuch manner as that it may be renewed and ſhifted as often as may be neceſſary, without moving the limb in any manner; it being certain, that when once a broken thigh or leg

has been properly put to rights, and has been depoſited properly on the pillow, it ought not ever to be lifted up or moved from it again without neceſſity, until the fracture is perfectly united; and it is as true, that ſuch neceſſity will not very often occur. This may perhaps ſeem ſtrange to thoſe who are accuſtomed to roll ſimple fractures, and conſequently to lift them up every three or four days, in order to renew ſuch kind of bandage: but the neceſſity of this motion ariſes merely from the kind of bandage made uſe of, and not from any circumſtance of the fracture itſelf. That the frequent motion of a fractured limb cannot poſſibly contribute to the eaſe of the patient, will, I ſuppoſe, be readily admitted; as I ſuppoſe alſo it will, that when a broken limb has been once depoſited in the beſt poſition poſſible, it is impoſſible to mend that poſition, merely by taking ſuch limb up and laying it down again; from whence it muſt follow, that ſuch kind of apparatus as neceſſitates the ſurgeon frequently to diſturb the limb, cannot be ſo good as one that does not; provided the latter will accompliſh the ſame kind of cure as the former: the truth of which poſition will appear in

the

the moſt ſatisfactory manner to any who will take a view of the method in which ſimple fractures are treated at the beforementioned hoſpital. Such application having been made as the ſurgeon thinks right, the next thing to be done is to put on a proper bandage.—— That uſed by the ancients and by the majority of the preſent practitioners, is what is commonly called a roller. This is of different length, according to the ſurgeon's choice, or as it may be uſed in the form of one, two or more pieces. Hippocrates uſed three *, Celſus ſix; but the preſent people ſeldom uſe more than one. By ſuch kind of bandage three intentions are aimed at, and ſaid to be accompliſhed, viz. to confine the fracture, to repreſs or prevent a flux of humours, and to regulate the callus †: but whoever will reflect ſeriouſly

* See on this ſubject Fab. ab Aquapendente, Wiſeman, Scultetus, Hildanus, Petit, Du Verney.

† "On applique la premiere ſur l'endroit meme de la "fracture. Son milieu doit repondre au centre. On fait "trois tours circulaires: ce qui ſert a affermir cet endroit, "qui eſt le ſeul, qui ait beſoin d'etre aſſujetti, comme "etant le ſeul qui peut ſe deranger, & *a contenir le ſuc "nouricier & empecher, qu'il ne s'echappe trop abondamment "& trop irregulierement a l'entour de la fracture; ce qui "feroit un cal tres difforme.*"

DU VERNEY.

ouſly on this matter will ſoon be convinced, that although ſome ſort of bandage is neceſſary in every ſimple fracture, as well for preſerving ſome degree of ſteadineſs to the limb, as for the retention of the applications, yet none, nor neither of theſe three ends can be anſwered merely, or even principally, by bandage of any kind whatever: and therefore if this ſhould be found to be true, that is, if it ſhould appear that whatever kind of deligation be made uſe of, it cannot be a principal, but only an acceſſorial kind of aſſiſtance, and that in a ſmall degree and very little to be depended upon, it will follow, that ſuch kind of bandage as is moſt difficult to be applied with juſtneſs and exactitude, ſuch as is ſooneſt relaxed and out of order, ſuch as ſtands moſt frequently in need of renewal, and in ſuch renewal is moſt likely to give pain and trouble, muſt be more improper and leſs eligible than one which is more eaſily applied, leſs liable to be out of order, and which can be adjuſted without moving the limb.

The ancient method of applying the roller in caſe of ſimple fracture of the leg or thigh, was to make * four or five turns round

* See a particular account of this in Fab. ab Aquapendente, and in Serjeant Wiſeman.

round the fracture firſt, and then to continue the bandage upward and downward, until the whole limb was enveloped properly. This was done in this manner with a double view; to keep the broken ends of the bone in their place, and to prevent the influx of humour. Modern practitioners, although they have the ſame ends in view, generally begin their bandage from the inferior extremity of the limb, and continue it up to the top. Whether the old or the later method be followed, whether one or more rollers be made uſe of, the whole is executed while the limb is kept by means of the aſſiſtants in the ſame extended poſture in which the coaptation was made, ſo that the whole bandage is finiſhed before the leg is depoſited on the pillow; in the doing all which, if from the tired ſtate of the ſurgeon *, or either of his aſſiſtants, or if from the awkwardneſs or unhandineſs of any

* The extraordinary length of time uſed by ſome in putting a fracture to rights, renders what I have called the *tired ſtate of the aſſiſtants* an object of importance. The good poſition of the fracture depends as much or more on them than on the ſurgeon. If the aſſiſtant who holds the foot varies from the proper manner, I defy the ſurgeon to redreſs the fracture without the concurrence of ſuch aſſiſtant.

any of the parties concerned, the true and exact poſition of the limb be at all deviated from, the ends of the bone will again be in ſome degree diſplaced, and the bandage inſtead of being of uſe will become prejudicial, by preſſing hard on the inequalities of the fracture: to which let me add, that the roller, eſpecially when applied to a leg, if it be not put on with due dexterity, that is, if it does not ſet perfectly ſmooth and even, is the moſt unequal and worſt kind of bandage in uſe.

Theſe objections, however juſt, are not the leaſt to which the roller in the caſe of ſimple fracture of the leg or thigh are liable; for, as I have already hinted, it muſt in a very ſhort ſpace of time, even while the parts ſurrounding the fracture are in the moſt tender and moſt painful ſtate, be renewed, and that more than once; which renewal cannot be executed without again taking the limb off from the pillow, again committing it to the hands of aſſiſtants, and again running a riſque of diſplacing the fracture: all which, not to mention the repetition of pain to the patient every time ſuch operation is performed, and which muſt be at leaſt every four or five days, are

(as

(as I have already ſaid) very material objections to the roller, even in the moſt judicious and dexterous hands, and ſtill more ſo in thoſe of the rude and ignorant.

The prevention of a flux of humors to a broken limb, by bandage, is a common phraſe; but they who uſe it have either no idea at all annexed to it, or a very erroneous one.

If by the points and edges of the broken bone the muſcles and membranes be unavoidably wounded and torn, or if the ſame kind of miſchief be incurred by the inadvertence or indiſcretion of the patient, or of thoſe who aſſiſted in getting him home, or from the violence uſed in extending the limb and ſetting the fracture, inflammation muſt be excited, and pain and tumefaction will be the conſequence; and theſe will continue for ſome time in every fracture; but that ſpace will be longer or ſhorter in different caſes and under different circumſtances: evacuation, reſt, and a favourable poſition of the limb will, and do in general, remove all theſe complaints; but bandage can contribute nothing more than by keeping the applications in their proper place; ſo far from it, that if the bandage be a roller it muſt,

muſt, by the frequent neceſſity of its being adjuſted, and the frequent motion of the limb, in ſome degree counteract the proper intention of cure.

The old writers are in general very preciſe as to the number of days during which the roller ſhould be ſuffered to remain without being ſhifted, and the number of times which ſuch ſhifting ſhould be repeated within the firſt fortnight *. This exactitude is by no means neceſſary; but if the bandage be ſuppoſed to be of any uſe at all, it is obvious, that it ought to be renewed or adjuſted as often as it may ceaſe to perform the office for which it is deſigned, or whenever it ſhall be found to counteract ſuch office, that is, as often as it ſhall become ſo ſlack as not to contain the fracture at all, or whenever the limb ſhall be ſo ſwollen, that the roller makes an improper degree of ſtricture; the former generally occurs every four

* "Tertio die a deligatione facta, Hippocrates faſcias reſolvit, &c. Facta bona deligature & pruritu non infectante, a tertio uſque ad ſeptimum oportet ægrum deligatum detinere.

"Septimo membrum rurſus ſolvendum perfundendum aqua tepida & ligandum."

Fab. ab Aquapendente.

four or five days, the latter is moſt frequent within the firſt week.

In moſt of the writers on the ſubject of fractures, we alſo find marks or ſigns laid down for our information concerning the due or undue effect of the bandage on the limb. They tell us, that when that part of it which is below the termination of the roller does not ſwell at all, that the bandage is not ſufficiently ſtrict, and will not retain the fracture; that when the ſame part is conſiderably ſwollen, or tenſe, or inflamed, it implies, that the binding is too ſtrait, and that a moderate degree of tumefaction is a ſign that the deligation is properly executed *.

* See on this Fab. ab Aquapendente, who ſpeaks or rather copies the ſentiments of Hippocrates and Celſus. " Terminus in ſtringendo debet eſſe bona laborantis tole-
" rantia: ut deligatum leviter premat, & ſic tum conti-
" neat & ſtabiliat fracturam, tum humores exprimat.
" Sunt etiam alia hujus ſigna, quæ altero die apparent;
" ſi enim æger eo die quo deligatus ſentiat ſe valentius
" ſtringi, poſtero vero die tumor laxus, mollis & parvus
" appareat, bona eſt deligatio, quia jam humores a parte
" fracta ſunt expreſſi. Si vero aut nullus tumor aut mag-
" nus & durus poſtridie in manu vel pede appareat, prava
" eſt deligatura; quia illa non continet hæc vero nimis
" arcta eſt & inflammationem movet. Id notandum faſ-
" cias

In conſequence of theſe precepts, many practitioners look more anxiouſly after this degree of tumefaction, than after the true and exact poſition of the limb, and cannot be induced to believe, that any thing can be wrong under this appearance; although if they would for once aſſume the liberty of thinking for themſelves, they might be convinced, that even this degree of ſwelling is wrong, that it implies ſome kind of obſtruction to the circulation, and cannot ſerve any good purpoſe; and conſequently that as far as it may be ſuppoſed to be the effect of bandage, ſo far that bandage muſt be faulty.

The third purpoſe for which the roller is ſaid to be uſed, is the regulation and reſtraint of the callus.

If we were to form our notion of callus by what the generality of writers have ſaid on this ſubject, we ſhould ſuppoſe, that it was not only a particular juice always ready for the purpoſe, but that, if not reſtrained and regulated by art, it would always flow in ſuch quantity, as to create trouble and deformity;

" cias magis ſtringi debere in parte fracta, quam alibi, " ut pars fracta magis illæſa ſervetur, ab humorum de- " fluxu."

deformity; that there were ſpecific remedies for increaſing or decreaſing it, and that it always required the hand and act of ſurgery to manage it. That the callus is ſo far a particular juice, as that it conſiſts of whatever is deſtined to circulate through the bones for their particular nouriſhment, is beyond all doubt; and that this gelatinous kind of fluid is the medium by which fractures are united is as true; but that it requires art to manage it, or that art is in general capable of managing and directing it, is by no means true. That this callus or uniting medium does oftentimes create tumefaction and deformity, or even lameneſs, is true alſo; but the fault in theſe caſes does not lie in the mere redundance of ſuch juice; it is derived from the nature of the fracture, from the inequality of it when ſet, and from the unapt poſition of the broken ends with regard to each other; nor is ſurgery or the ſurgeon any otherwiſe blameable in this caſe, than as it was, or was not originally in their power to have placed them better. It is the inequality of the fracture which makes both the real and apparent redundance of callus, and the tumefaction in the place of union. When a

bone has been broken tranſverſely, or nearly ſo, and its inequalities are therefore neither many nor great, when ſuch broken parts have been happily and properly coaptated, and proper methods have been uſed to keep them conſtantly and ſteadily in ſuch ſtate of coaptation, the divided parts unite by the intervention of the circulating juice, juſt as the ſofter parts do, allowing a different ſpace of time for different texture and conſiſtence. When the union of a broken bone under ſuch circumſtances has been procured, the place where ſuch union has been made will be very little perceptible, it will be no deformity, nor will it occaſion any inconvenience. It will indeed be diſcoverable, like a cicatrix of a wound in a ſofter part, but there will be no redundance of callus, becauſe none will be wanted; neither will there be any neceſſity for any particular management on the part of the ſurgeon, to repreſs or keep it in order: But when a bone has been broken very obliquely or very unequally, when the parts of a fracture are ſo circumſtanced as not to admit of exact coaptation, when ſuch exact coaptation as the fracture perhaps would have admitted has not been judiciouſly made, when from unmanageableneſs,

neſs, inadvertence or ſpaſm, the proper poſition of the limb has not been attended to or preſerved, in all ſuch caſes there muſt be conſiderable inequality of ſurface; there muſt be riſings on one ſide and depreſſions on another; and in ſuch caſes the juices circulating through the bone, cannot accompliſh the union in the ſame quantity, the ſame time, or in the ſame manner. The broken parts not being applied exactly to each other, there cannot be the ſame aptitude to unite; and according to the greater or leſſer degree of exactitude in the coaptation, that is, according as the ends of the bones are or have been placed more or leſs even with regard to each other, will the inconvenience and the deformity be; and ſtill moſt where the fracture is not ſet at all, but the broken ends of the bone unite laterally, or by touching each other's ſides. The reaſon of all this is ſo obvious, without having recourſe to a particular ſpecific juice under the name of callus, that it would be an inſult upon the reader's underſtanding to explain it farther *. The perioſteum covering every

* On the ſubject of callus, the editor of Du Verney tells a ſtory from Galen, and which himſelf ſeems not to diſbelieve,

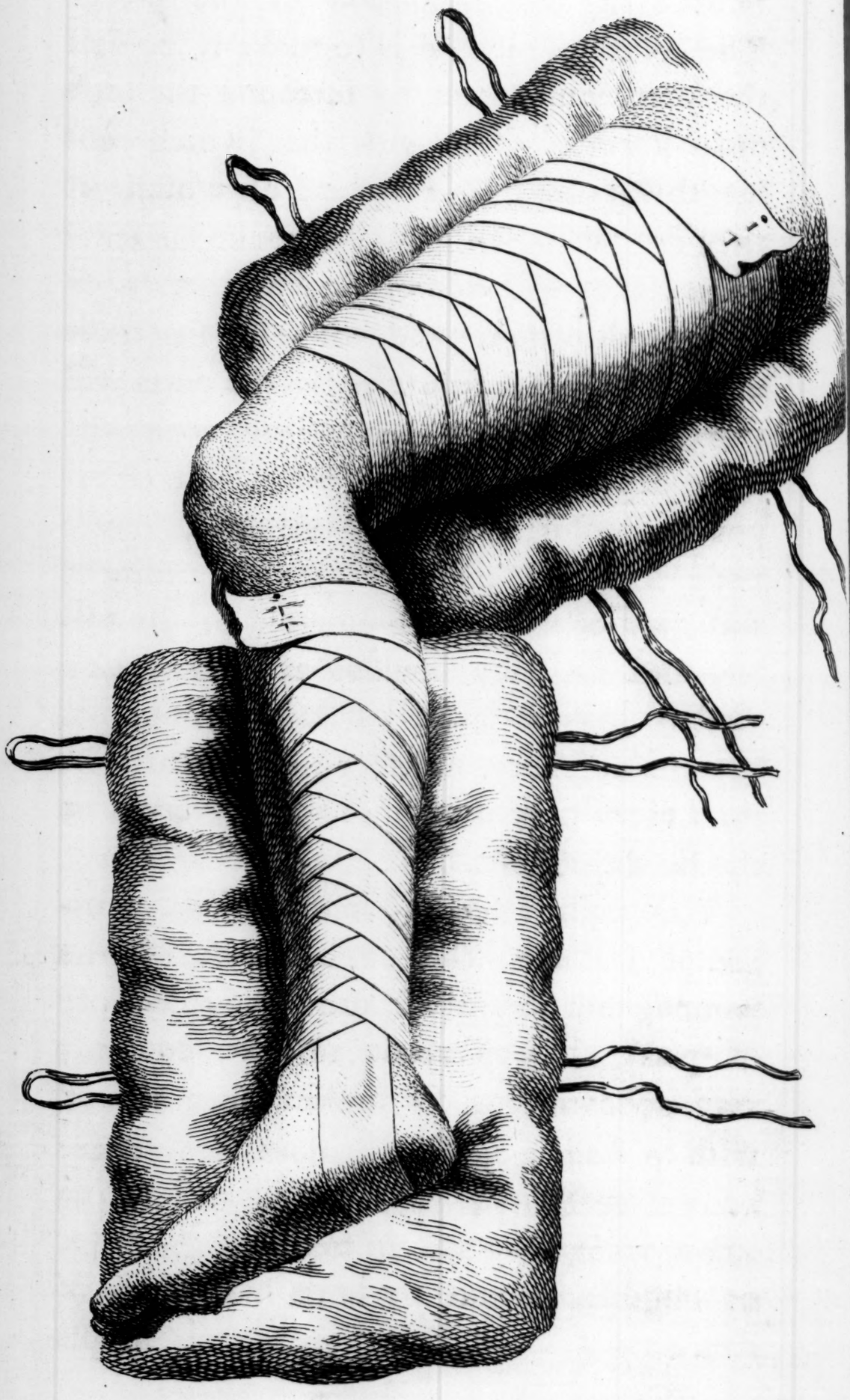
every fracture, will remain thickened for ſome time, and a degree of fulneſs or riſing will be thereby cauſed about the place where ſuch fracture has been united, but time, and the uſe of the muſcles, ſoon in general remove this.

In ſhort this doctrine of callus, conſidered as a particular kind of juice, and as being liable to great redundance if not prevented by art, has not only miſled many people, but has often been made uſe of as a cover to ignorance and neglect. When lameneſs and deformity have been the conſequences of one or both theſe cauſes, more than of the nature and circumſtances of a fracture, the callus has been found ready at hand to take the blame, and the ideal exuberance of this cement has often been urged, as an excuſe for real want of knowledge, or for groſs neglect.

The beſt and moſt uſeful bandage for a ſimple fracture of the leg or thigh, is what is commonly known by the name of the eighteen-tailed bandage, or rather one made on the ſame principle, but with a little difference

diſbelieve, viz. that a callus in a particular caſe, was ſo redundant as to tranſude through the ſkin, and to keep the compreſſes conſtantly wet.

To face page 37.



ference in the diſpoſition of the pieces. The common method is to make it ſo, that the parts which are to ſurround the limb make a right angle with that which runs lengthways under it; inſtead of which, if they are tacked on ſo as to make an acute angle, they will fold over each other in an oblique direction, and thereby ſit more neatly and more ſecurely, as the parts will thereby have more connection with and more dependance on each other. In compound fractures, as they are called, every body ſees and acknowledges the utility of this kind of bandage preferable to the roller, and for very obvious and convincing reaſons, but particularly becauſe it does not become neceſſary to lift up and diſturb the limb every time it is dreſſed, or every time the bandage looſens.

The pain attending motion in a compound fracture, the circumſtance of the wound, and the greater degree of inſtability of parts thereby produced, are certainly very good reaſons for dreſſing ſuch wound with a bandage, which does not render motion neceſſary; but I ſhould be glad to know what can make it neceſſary, or right, or eligible, to move a limb in the caſe of

ſimple fracture? what benefit can be propoſed by it? what utility can be drawn from it? When a broken bone has been well ſet, and the limb well placed, what poſſible advantage can ariſe from moving it? ſurely none; but, on the contrary, pain and probable miſchief. Is it not the one great intention, to procure unition? Can moving the limb every two or three days contribute to ſuch intention? muſt it not on the contrary obſtruct and retard it? Is not perfect quietude as neceſſary toward the union of the bone, in a ſimple as in a compound fracture? It is true, that in the one there is a wound which requires to be dreſſed, and the motion of the limb may in general be attended with rather more pain than in the other; but does motion in the ſimple fracture give eaſe, or procure more expeditious union?

Every benefit then which can be ſuppoſed to be obtained from the uſe of the common bandage or roller is equally attainable from the uſe of that which I have juſt mentioned, with one additional, and to the patient moſt invaluable advantage, viz. that of never finding it neceſſary to have his leg or thigh once during the cure removed from the pillow on which

which it has been properly depoſited. In ſhort, to quit reaſoning and ſpeak to fact, it is the conſtant practice at St. Bartholomew's, and attended with all poſſible ſucceſs. We always uſe the eighteen-tailed bandage, and never move the limb to renew or adjuſt it *.

The parts of the general apparatus for a ſimple fracture, which come next in order, are the ſplints.

Theſe are generally made of paſte-board, wood, or ſome reſiſting kind of ſtuff, and are ordered to be applied lengthways on the broken limb; in ſome caſes three, in others four; for the more ſteady and quiet detention of the fracture.

That ſplints properly made and judiciouſly applied are very ſerviceable, is beyond all doubt, but their utility depends much on their ſize and the manner in which they are applied.

In general practice, they are made of ſuch length, as not to reach either upward or downward,

* See the different opinions of different French practitioners, with their reaſons on this ſubject, in Du Verney, Traitè des Maladies des Os.

downward, ſo far as the roller extends; not to comprehend either the upper or the lower joint of the broken bone, and to exceed the fracture either way not many inches: they do not, for example, in the broken leg, comprehend either the joint of the knee, or the joint of the ancle, and act only on the fracture *.

In

* This is the old doctrine, and has been almoſt univerſally and conſtantly adhered to and followed. Our forefathers, finding that ſuch ſplints as they uſed and applied in their manner excited pain and inflammation, did not uſe, but forbad them until after ſeven days were paſt, and the firſt inflammation, as they thought, was over.

After this, they put them on to ſtrengthen the fracture, as they ſaid, and therefore made them ſhort for that purpoſe only, expreſsly cautioning us againſt the only method of applying them (in the caſe of a broken leg) in which they can be really uſeful, viz. that in which they comprehend both the knee and ancle.

" Ferularum uſus idem eſt ac pannorum ad fractum os " continendum, ut maneat immotum, etiamſi membrum " univerſum moveatur.

" Jubet Hippocrates leves eſſe ferulas & æquales & ad " extrema reſimas, &c.

" Sed & *breviores ferulas* eſſe *præcipit ipſa* vinctura, ne " quando cutem proximam tentare valeant eminentem " plerumque ob humores receptos, quos faſciæ extur- " bant. Id quoque cavere oportet, ne ad oſſium emi- " nentias, quales in ima tibia & ſura ſunt, ferulæ per- " tingant, &c. &c. &c."

Oribaſius de Fracturis.

" Sed

In this manner of application and of this ſize, they are in fact neither more nor leſs than compreſſes, and compreſſes made of very bad materials. All the good that ever is, or that can be done by them, when of ſuch length and ſo applied, might certainly be done in a better manner by a more proper kind of compreſs, and every diſadvantage, which a hard reſiſting compreſs, injudiciouſly applied, is capable of producing, is probable to reſult from them thus uſed.

The true and proper uſe of ſplints is, to preſerve ſteadineſs in the whole limb, without compreſſing the fracture at all. By the former they become very aſſiſtant to the curative intention, by the latter they are very capable of cauſing pain and other inconveniences; at the ſame time that they cannot, in the nature of things, contribute to the ſteadineſs of the limb.

In order to be of any real uſe at all, ſplints ſhould, in the caſe of a broken leg, reach

" Sed hoc tempore (poſt ſeptimum diem) vice plagula-
" rum oportet ferulas apponere.

" His utebatur Hippocrates demum poſt ſeptimum
" diem; quia ante ſeptimum magis urgebat intentio ar-
" cendæ inflammationis, quam intentio ſtabiliendi frac-
" turam; poſt ſeptimum autem contra accidit."

Fab. ab Aquapendente.

reach above the knee and below the ancle; ſhould be only two in number, and ſhould be ſo guarded with tow, rag or cotton, that they ſhould preſs only on the joints, and not at all on the fracture.

By this they become really ſerviceable; but a ſhort ſplint, which extends only a little above and a little below the fracture, and does not take in the two joints, is an abſurdity; and, what is worſe, it is a miſchievous abſurdity.

By preſſing on both joints, they keep not only them, but the foot ſteady; by preſſing on the fracture only, they cannot retain it in its place, if the foot be in the ſmalleſt degree diſplaced, but they may, and frequently do occaſion miſchief, by rudely preſſing the parts covering the fracture againſt the edges and inequalities of it.

I ſuppoſe it will be ſaid, that although ſhort ſplints do not of themſelves ſuſtain and keep ſteady the two joints, and conſequently the limb, yet that purpoſe in the broken leg may be and is fulfilled by junks, fanons and other contrivances: To which I anſwer, that then the ſhort ſplints are in that caſe of no uſe at all, and had better be laid aſide; they ſhould be uſed for no other

pur-

purpoſe, but that of keeping the limb ſteady; and if they do not anſwer that end, they are an incumbrance, and multiply the articles in the apparatus for a fractured leg, very unneceſſarily.

In the caſe of a fractured os femoris, if the limb be laid in an extended poſture, one ſplint ſhould certainly reach from the hip to the outer ancle, and another (ſomewhat ſhorter) ſhould extend from the groin to the inner ancle. In the caſe of a broken tibia and fibula, there never can be occaſion for more than two ſplints, one of which ſhould extend from above the knee to below the ancle on one ſide, and the other ſplint ſhould do the ſame on the other ſide. The manner of applying them, if the limb be depoſited in a ſtate of flexion, will come under the next article.

This, and indeed the moſt eſſential article in the treatment of a fracture is, the poſition of the limb. Upon the judicious or injudicious, the proper or improper execution of this, depends the eaſe of the patient during his confinement, and the free uſe and natural appearance of his limb afterward.

If

If I meant to deſcribe, or if I approved (pardon the phraſe) the common method of placing the broken leg and thigh in a ſtraight manner, this would be the place to mention the many very ingenious contrivances and pieces of machinery, which practitioners, both ancient and modern, have invented for the purpoſe of keeping the whole limb ſtraight and ſteady, that is, of keeping all the muſcles ſurrounding the fractured bone conſtantly upon the ſtretch, and at the ſame time of preventing any inequality in the union of it, and any ſhortening of the limb, in conſequence of ſuch inequality.

But as it is my intention by theſe ſheets, to inculcate another, and as it appears to me a better diſpoſition of the limb, in which ſuch boxes, cradles, and pieces of machinery are not wanted, nor can be uſed, it is needleſs for me to ſay any thing about them.

According to this plan, the fractured leg and thigh ſhould be depoſited on the pillow, in the very poſture in which the extenſion was made, and the fracture ſet, that is with the knee bent.

I have

I have already been ſo explicit, or perhaps prolix, on the tenſe and lax ſtate of the muſcles, as depending on poſture, under the head of extenſion, that I ſhall ſpare the reader, as well as myſelf, a good deal of trouble by referring back to that article. All that is there urged, or that can be urged for making the extenſion, that is, for ſetting a fracture in ſuch diſpoſition of a limb or its muſcles, is equally powerful and concluſive with regard to the manner of depoſiting and leaving it after it has been ſet. Whatever render reduction and coaptation eaſy, muſt as neceſſarily maintain eaſe during the confinement, preſerve rectitude of figure, and prevent diſplacement. The ſame principle muſt act on both occaſions, and whether the doctrine be right or wrong, conſidered by itſelf, it muſt be equally ſo in both circumſtances, that is, in the manner of ſetting a fracture, and in the manner of depoſiting the limb afterward *. In the caſe

* It has been ſaid, that the ſtraight poſition of a limb, by putting the muſcles on the ſtretch, induces them to contribute to the ſecurity of the fracture againſt diſplacement. If this be the caſe in general, how happens it that thoſe bones are always found moſt liable to be diſplaced when broken, and to be moſt difficult to keep in their proper place, which are ſurrounded by the moſt and by the ſtrongeſt muſcles?

caſe of the fractured os humeri, the only poſition in which it can with any tolerable convenience to the patient be placed is, with the elbow bent, that very poſition which neceſſarily relaxes and removes all the reſiſtance of the ſurrounding muſcles. Daily experience evinces the utility of this, by our very ſeldom meeting with lameneſs or deformity after it, notwithſtanding the prevailing apprehenſion of exuberant callus.

The deformity frequently conſequent to the fracture of the bones of the cubit, particularly that of the radius only, will generally, if not always, be found to be in proportion as the muſcles concerned in the propation and ſupination of the hand happen to be put more or leſs into a ſtate of action, or tenſion by the poſition of the limb.

In the thigh, the caſe is ſtill more obvious, as the muſcles are more numerous and ſtronger.

The ſtraight poſture puts the majority of them into action, by which action that part of the broken bone, which is next to the knee, is pulled upward, and by paſſing more or leſs underneath that part

which

which is next to the hip, makes an inequality or riſing in the broken part, and produces a ſhortneſs of the limb.

In the fracture of both bones of the leg, the caſe is ſtill the ſame; a ſtraight poſition puts the muſcles upon endeavouring to act; a moderate flexion of the knee relaxes them, and takes off ſuch propenſity *.

The diſpoſition therefore of the broken cubit ought to be that which, by putting the hand into a middle ſtate between pronation and ſupination, and by bending the fingers moderately, keeps the radius ſuperior to the ulna; or in other words, the palm of the hand ſhould be applied to the breaſt, the thumb ſhould be ſuperior, the little finger inferior; and the hand ſhould be kept in this poſture conſtantly by means of two ſplints, which ſhould reach from the joint of the elbow on each ſide, and ſhould be extended below the fingers; or the ſame purpoſe may be ſtill better anſwered by a ſimple neat contrivance of the very ingenious Mr. Gooch

* In proportion as the fracture ſhall happen to be more or leſs oblique, the truth of this doctrine will upon experiment be found to be more or leſs apparent, as well as uſeful.

Gooch of Norfolk; of which he has given a draught, and which is preferable to a common ſplint, by its admitting the fingers to be more eaſily bent.

The poſition of the fractured os femoris ſhould be on its outſide, reſting on the great trochanter; the patient's whole body ſhould be inclined to the ſame ſide; the knee ſhould be in a middle ſtate, between perfect flexion and extenſion, or half bent; the leg and foot lying on their outſide alſo, ſhould be well ſupported by ſmooth pillows, and ſhould be rather higher in their level than the thigh; one very broad ſplint of deal, hollowed out and well covered with wool, * rag, or tow, ſhould be placed under the thigh, from above the trochanter quite below the knee, and another ſomewhat ſhorter ſhould extend from the groin below the knee on the inſide, or rather in this poſture on the upper ſide; the bandage ſhould be of the eighteen-tail kind, and when the bone has been ſet, and the thigh well placed on the pillow, it ſhould not, without

* If the pillow on which the broken thigh is place be not too thick, the ſplint may with equal advantage be placed underneath ſuch pillow, and in many caſes this will be found to be the beſt manner of uſing it.

without neceſſity, (which neceſſity in this method will ſeldom occur) be ever moved from it again until the fracture is united; and this union will always be accompliſhed in more or leſs time, in proportion as the limb ſhall have been more or leſs diſturbed.

In the fracture of the fibula only, the poſition is not of much conſequence, becauſe by the tibia remaining intire, the figure of the leg is preſerved and extenſion quite unneceſſary; but ſtill even here the laying the leg on its ſide, inſtead of on the calf, is attended with one very good conſequence, viz. that the confinement of the knee, in a moderately bent poſition, does not render it ſo incapable of flexion and uſe afterward, as the ſtraight or extended poſition of it does, and conſequently that the patient will be much ſooner able to walk, whoſe leg has been kept in the former poſture, than he whoſe leg has been confined in the latter.

In the fracture of both tibia and fibula, the knee ſhould be moderately bent, the thigh, body and leg in the ſame poſition as in the broken thigh. If common ſplints be uſed, one ſhould be placed underneath the

leg, extending from above the knee to below the ancle, the foot being properly ſupported by pillows, bolſters, &c. and another ſplint of the ſame length ſhould be placed on the upper ſide, comprehending both joints in the ſame manner; which diſpoſition of ſplints ought always to be obſerved, as to their length, if the leg be laid extended in the common way, only changing the nominal poſition of them, as the poſture of the leg is changed, and calling what is inferior in one caſe, exterior in the other, and what is ſuperior in one, in the other interior *.

If Mr. Sharpe's ſplints be made uſe of, there is in one of them a proviſion for the more eaſy ſupport of the foot and ancle, by an excavation in, and a prolongation of the lower

* All writers on this ſubject agree in giving us cautions about defending the heel, and filling up the hollow from it to the calf of the leg; and this they do on account of the pain, excoriation, and even ulceration, which ſometimes attends the ſtraight poſition, with the limb reſting on the heel.

Many of them have alſo taken notice of an accident ſometimes attendant on a broken leg, but which really ought to be ſet to the account of the poſture in which ſuch leg is placed, more than to that of the fracture; I mean the ſhrinking or waſting of the calf.

lower or fibular ſplint, for the purpoſe of keeping the foot ſteady.

I hope that I have expreſſed my meaning clearly; I ſhould be very ſorry to be miſtaken, becauſe it appears to me to be a matter of ſome conſequence; and if what I have ſaid be intelligible, the reader will underſtand from thence, that I mean to ſignify that, (in my opinion,) extenſion will in general be made with more facility, and coaptation more happily executed, that a patient will ſuffer a great deal leſs pain during theſe operations, as well as during the neceſſary confinement for a broken leg or thigh, and that both patient and ſurgeon will be leſs likely to be diſappointed in their intention and wiſh, that is, that the former will be leſs liable to lameneſs or deformity, when a fractured thigh or leg has been treated in the way I have deſcribed than in the common one.

The reſiſtance neceſſarily made by the muſcles, joined to the great inſtability of parts in every ſpecies of fractured leg or thigh, except in the few where the bones

leg, extending from above the knee to below the ancle, the foot being properly ſupported by pillows, bolſters, &c. and another ſplint of the ſame length ſhould be placed on the upper ſide, comprehending both joints in the ſame manner; which diſpoſition of ſplints ought always to be obſerved, as to their length, if the leg be laid extended in the common way, only changing the nominal poſition of them, as the poſture of the leg is changed, and calling what is inferior in one caſe, exterior in the other, and what is ſuperior in one, in the other interior *.

If Mr. Sharpe's ſplints be made uſe of, there is in one of them a proviſion for the more eaſy ſupport of the foot and ancle, by an excavation in, and a prolongation of the lower

* All writers on this ſubject agree in giving us cautions about defending the heel, and filling up the hollow from it to the calf of the leg; and this they do on account of the pain, excoriation, and even ulceration, which ſometimes attends the ſtraight poſition, with the limb reſting on the heel.

Many of them have alſo taken notice of an accident ſometimes attendant on a broken leg, but which really ought to be ſet to the account of the poſture in which ſuch leg is placed, more than to that of the fracture; I mean the ſhrinking or waſting of the calf.

lower or fibular ſplint, for the purpoſe of keeping the foot ſteady.

I hope that I have expreſſed my meaning clearly; I ſhould be very ſorry to be miſtaken, becauſe it appears to me to be a matter of ſome conſequence; and if what I have ſaid be intelligible, the reader will underſtand from thence, that I mean to ſignify that, (in my opinion,) extenſion will in general be made with more facility, and coaptation more happily executed, that a patient will ſuffer a great deal leſs pain during theſe operations, as well as during the neceſſary confinement for a broken leg or thigh, and that both patient and ſurgeon will be leſs likely to be diſappointed in their intention and wiſh, that is, that the former will be leſs liable to lameneſs or deformity, when a fractured thigh or leg has been treated in the way I have deſcribed than in the common one.

The reſiſtance neceſſarily made by the muſcles, joined to the great inſtability of parts in every ſpecies of fractured leg or thigh, except in the few where the bones

are broken tranſverſely, has conſtantly exerciſed the invention and ingenuity of practitioners, in deviſing means to prevent inequality in the callus as it is called, and ſhortneſs and deformity in the limb. Our books abound with draughts and deſcriptions of machines for this purpoſe; ligatures, pullies, leaden weights and fracture-boxes, ſo conſtructed, as to overcome and conſtantly to reſiſt that action of the muſcles ſurrounding the broken bone, that natural tendency in them to contract, which the extended poſition of the limb neceſſarily induces. Every body who has been converſant with matters of this ſort knows, that even the beſt of theſe various contrivances often prove ſucceſsleſs, and every one who will reflect ever ſo little may ſee why they muſt be ſo. That they do prove ineffectual, the number of deformed legs and ſhortened thighs, which are daily met with, evinces; and that they muſt frequently prove ſo will be obvious to every one, who will conſider that the effect can laſt no longer than the cauſe is continued, unleſs there happens to be ſome very favourable

circum-

circumſtance in the fracture itſelf. What I mean is this, when the reduction of the fracture is ſet about, the limb is put into ſuch poſition, that the ſurrounding muſcles reſiſt the extending force very conſiderably, and this in proportion to their ſtrength and number: that force is continued and increaſed till the muſcles give way, and the reſiſtance being overcome, an opportunity is thereby obtained of placing the ends of the fracture in as apt poſition with regard to each other, as the nature of it will admit. If the fracture be of the tranſverſe kind, that is, if the ends of the broken bone be large and afford a good deal of ſpace for contact with each other, ſuch appoſition will contribute a good deal to the keeping the limb ſteady and the fracture even; but if the fracture be of the oblique kind, if there be ſeveral looſe pieces, and conſequently neither large contact nor ſtability from the appoſition, or if due extenſion has not been made or could not, or if the ends of the bones have not been judiciouſly and properly ſet, the muſcles will act as ſoon as the extenſion is relaxed, the fracture will be more or leſs diſplaced, according to the nature of it, the limb will be ſhortened, the

time of union will be prolonged, and the place of it (the callus, as it is called) will be in proportion more or leſs unequal.

I take it for granted that it will be aſked, Have not our anceſtors in all times happily redreſſed fractured legs and thighs, by the method which they have delivered down to us, and which in the preceding pages I have taken the liberty to object to? have not ſuch limbs frequently been rendered as ſtraight, as uſeful, and as little deformed as poſſible? I anſwer, moſt certainly, yes; it is an undoubted truth and cannot be denied. But in my turn, let me be permitted to aſk, Whether in the ſame method great and even unſurmountable difficulty is not frequently met with? whether in many caſes the act of ſetting, as it is called, is not exceſſively painful at the time, and productive of inflammation and other diſagreeable ſymptoms afterward? and whether in ſpite of all care, of every contrivance, of every ſpecies of machinery which has yet been uſed, broken thighs and legs are not often, very often left deformed, crooked and ſhortened, and that merely from the action of the muſcles and the obliquity or ſhattered ſtate of the fracture? The fact is notorious, and the

ſole

ſole queſtion is, Whether or no a different diſpoſition of the parts, preventing ſuch action and ſuch reſiſtance, will in many inſtances prevent theſe evils? to which, from repeated experience, I anſwer, yes. If this ſhould be found to be the caſe in general, of which I make no doubt; that is, if by this method, many of ſuch unfortunate caſes, as in the common method of treatment diſappoint both patient and ſurgeon, ſhould be found in general to ſucceed ſo well as to ſatisfy both, it will prove all I wiſh it ſhould prove. Superior utility and more frequent ſucceſs are all I contend for.

Many people did very well under amputation before the double inciſion was practiſed; but is the double inciſion therefore no improvement? The operation for the bubonocele may be performed with that clumſy inſtrument the probe ſciſſars, but is the biſtoury therefore not preferable? A ſurgeon may cut off ſome ounces, or even pounds of fleſh from a patient's backſide, in order to cure a ſinus, but is the cure by the ſimple diviſion of that ſinus therefore not eaſier or more expeditious? Neither of theſe can (I think) be proved, unleſs it can at the ſame time be proved, that pain is no

evil, confinement not at all irkſome, and that deformity and elegance of figure are ſynonimous terms.

Let not the reader fancy that I would dare to amuſe him with ſpeculation, or merely ſpecious reaſoning on a ſubject like this. What I have ſaid is from experience, repeated experience both of myſelf and of others, for a conſiderable length of time paſt, and on a great variety of ſubjects; from an experience which has perfectly ſatisfied me, and I think will every man who will make the trial fairly and candidly. — I do not pretend to ſay, that by theſe means every kind of broken bone will infallibly and certainly be brought to lie ſmooth, even, and of proper length; if I did, they who are verſed in theſe things, would know that I ſaid too much; but I will ſay, (what is ſufficient for my purpoſe) that it will not only ſucceed in all thoſe, in which the old method can ever be ſucceſsful, but alſo in the majority of thoſe in which it is not nor in the nature of things can. In thoſe fortunate caſes, in which either method will do, the old one is fatiguing, inconvenient, and even ſometimes offenſive, from the ſupine

and

and confined poſture of the patient; whereas that which is here propoſed gives the patient much greater liberty of motion for every purpoſe either of choice or neceſſity, and in many of thoſe caſes, wherein the old method proves moſt frequently ſo far ſucceſsleſs, as to leave the limb ſhort, lame, or deformed; I ſay, in moſt of theſe the propoſed method will not be attended with theſe inconveniences.

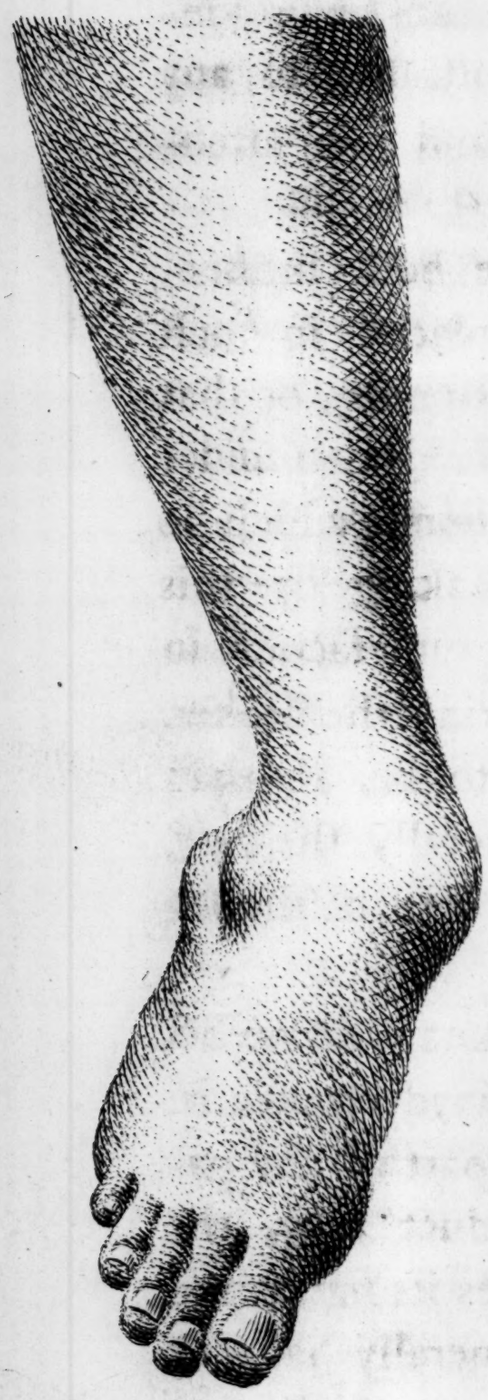
I have already ſaid, that in moſt caſes of broken thigh or leg, the method juſt deſcribed will be attended with great ſucceſs: but there is one particular caſe in which its utility is ſtill more conſpicuous; a caſe which, according to the general manner of treating it, gives infinite pain and trouble both to the patient and ſurgeon, and very frequently ends in the lameneſs and diſappointment of the former, and the diſgrace and concern of the latter: I mean the fracture of the fibula attended with a diſlocation of the tibia.

Whoever will take a view of the leg of a ſkeleton, will ſee that although the fibula be a very ſmall and ſlender bone, and very inconſiderable in ſtrength, when compared with the tibia, yet the ſupport of the lower

joint

joint of that limb, (the ancle) depends ſo much on this ſlender bone, that without it the body would not be upheld, nor locomotion performed, without hazard of diſlocation every moment. The lower extremity of this bone, which deſcends conſiderably below that end of the tibia, is by ſtrong and inelaſtic ligaments firmly connected with the laſt-named bone, and with the aſtragalus, or that bone of the tarſus which is principally concerned in forming the joint of the ancle. This lower extremity of the fibula has, in its poſterior part, a ſuperficial ſulcus for the lodgment and paſſage of the tendons of the peronei muſcles, which are here tied down by ſtrong ligamentous capſulæ, and have their action ſo determined from this point or angle, that the ſmalleſt degree of variation from it, in conſequence of external force, muſt neceſſarily have conſiderable effect on the motions they are deſigned to execute, and conſequently diſtort the foot. Let it alſo be conſidered, that upon the due and natural ſtate of the joint of the ancle, that is, upon the exact and proper diſpoſition of the tibia and fibula, both with regard to each other and to the aſtragalus, depend the juſt diſpoſition and proper action of

to face page 59.



of ſeveral other muſcles of the foot and toes; ſuch as the gaſtrocnemii, the tibialis anticus, and poſticus, the flexor pollicis longus, and the flexor digitorum pedis longus, as muſt appear demonſtrably to any man who will firſt diſſect and then attentively conſider theſe parts.

If the tibia and fibula be both broken, they are both generally diſplaced in ſuch manner, that the inferior extremity, or that connected with the foot, is drawn under that part of the fractured bone which is connected with the knee; making by this means a deformed, unequal tumefaction in the fractured part, and rendering the broken limb ſhorter than it ought to be, or than its fellow. And this is generally the caſe, let the faacture be in what part of the leg it may.

If the tibia only be broken, and no act of violence, indiſcretion, or inadvertence be committed, either on the part of the patient or of thoſe who conduct him, the limb moſt commonly preſerves its figure and length; the ſame thing generally happens if the fibula only be broken, in all that part of it, which is ſuperior to letter *A* in the annexed figure, or in any part of it between

tween its upper extremity, and within two or three inches of its lower one.

I have already ſaid, and it will obviouſly appear to every one who examines it, that the ſupport of the body and the due and proper uſe and execution of the office of the joint of the ancle depend almoſt entirely on the perpendicular bearing of the tibia upon the aſtragalus, and on its firm connection with the fibula. If either of theſe be perverted or prevented, ſo that the former bone is forced from its juſt and perpendicular poſition on the aſtragalus, or if it be ſeparated by violence from its connection with the latter, the joint of the ancle will ſuffer a partial diſlocation internally *; which partial diſlocation cannot happen without not only a conſiderable extenſion, or perhaps laceration of the burſal ligament of the joint, which is lax and weak, but a laceration of thoſe ſtrong tendinous ligaments, which connect the lower end of the tibia with the aſtragalus and os calcis, and which conſtitute in great meaſure the ligamentous ſtrength of the joint of the ancle.

This

* See the figure at the preceding page.

This is the caſe, when by leaping or jumping the fibula breaks in the weak part already mentioned, that is within two or three inches of its lower extremity. When this happens, the inferior fractured end of the fibula falls inward toward the tibia, that extremity of the bone which forms the outer ancle is turned ſomewhat outward and upward, and the tibia having loſt its proper ſupport, and not being of itſelf capable of ſteadily preſerving its true perpendicular bearing, is forced off from the aſtragulus inwards, by which means the weak burſal, or common ligament of the joint is violently ſtretched, if not torn, and the ſtrong ones, which faſten the tibia to the aſtragalus and os calcis, are always lacerated, thus producing at the ſame time a perfect fracture and a partial diſlocation, to which is ſometimes added a wound in the integuments, made by the bone at the inner ancle. By this means, and indeed as a neceſſary conſequence, all the tendons which paſs behind or under, or are attached to the extremities of the tibia and fibula, or os calcis, have their natural direction and diſpoſition ſo altered, that inſtead of performing their appointed actions, they all contribute

bute to the diſtortion of the foot, and that by turning it outward and upward.

When this accident is accompanied, as it ſometimes is, with a wound of the integuments of the inner ancle, and that made by the protruſion of the bone, it not infrequently ends in a fatal gangrene, unleſs prevented by timely amputation, though I have ſeveral times ſeen it do very well without. But in its moſt ſimple ſtate, unaccompanied with any wound, it is extremely troubleſome to put to rights, ſtill more ſo to keep it in order, and unleſs managed with addreſs and ſkill, is very frequently productive both of lameneſs and deformity ever after.

After what has been ſaid, a farther explanation why this is ſo is unneceſſary. Whoever will take even a curſory view of the diſpoſition of the parts, will ſee that it muſt be ſo. By the fracture of the fibula, the dilatation of the burſal ligament of the joint, and the rupture of thoſe which ſhould tie the end of the tibia firmly to the aſtragalus and os calcis, the perpendicular bearing of the tibia on the aſtragalus is loſt, and the foot becomes diſtorted; by this diſtortion the direction and action of all the muſcles already recited are ſo altered, that it

becomes

becomes (in the uſual way of treating this caſe) a difficult matter to reduce the joint, and, the ſupport of the fibula being gone, a more difficult one to keep it in its place after reduction. If it be attempted with compreſs and ſtrict bandage, the conſequence often is a very troubleſome as well as painful ulceration of the inner ancle, which very ulceration becomes itſelf a reaſon why ſuch kind of preſſure and bandage can be no longer continued; and if the bone be not kept in its place, the lameneſs and deformity are ſuch, as to be very fatiguing to the patient, and to oblige him to wear a ſhoe with an iron, or a laced buſkin, or ſomething of that ſort, for a great while, or perhaps for life.

All this trouble, pain, difficulty, and inconvenience, are occaſioned by putting and keeping the limb in ſuch poſition, as neceſſarily puts the muſcles into action, or into a ſtate of reſiſtance, which in this caſe is the ſame. This occaſions the difficulty in reduction, and the difficulty in keeping it reduced; this diſtorts the foot, and by pulling it outward and upward makes that deformity, which always accompanies ſuch accident; but if the poſition of the limb

be

be changed, if by laying it on its outſide with the knee moderately bent, the muſcles forming the calf of the leg, and thoſe which paſs behind the fibula and under the os calcis, are all put into a ſtate of relaxation and non-reſiſtance, all this difficulty and trouble do in general vaniſh immediately; the foot may eaſily be placed right, the joint reduced, and by maintaining the ſame diſpoſition of the limb, every thing will in general ſucceed very happily, as I have many times experienced.

Two kinds of fracture there are, and only two that I can recollect (relative to the limbs) which do not admit of the bent poſition of the joints, I mean that of the proceſſus olecranon at the elbow, and that of the patella; in theſe a ſtraight poſition of the arm and leg is neceſſary, in the former to keep the fractured parts in contact till they are united, in the latter, to bring them as near to each other as may beſt ſerve the purpoſe of walking afterward *.

With

* Although a ſtraight poſition of the limb is neceſſary for the broken patella, yet this very poſition becomes ſo upon the ſame principle, as renders the bent poſture moſt advantageous in the broken tibia and femur, viz. the relaxation

With regard to the fracture of the patella, an opinion has long and generally prevailed, which ſeems to me to have no foundation in truth, or (when duly conſidered) even in probability; it is, that the great degree of ſtiffneſs in the joint of the knee, which is ſometimes found to be the conſequence of this kind of fracture, is owing to,

laxation of the muſcles and tendons attached to the fractured bone.

Whoever will for moment attend to the diſpoſition of the pieces in a patella, which has been broken tranſverſely, will ſee how little neceſſary or uſeful the many contrivances of bandages, ſtraps, compreſſes, buckles, buttons, &c. to be found in writers are, eſpecially all that part of them which are applied to the inferior fragment.

By the action of the united tendons of the extenſores muſcles of the leg, the ſuperior fragment is pulled upward and ſeparated from the inferior, but the latter remains nearly, if not abſolutely, where it was before the accident; there is nothing to act upon it, and therefore it cannot, nor does it move.

The extenſion of the leg puts the muſcles attached to the upper part of the broken bone into a ſtate of relaxation, and prevents their acting; and though a ſmall compreſs juſt above this piece, with a moderate bandage, may be uſeful toward retaining it, yet it is the poſition of the leg which muſt keep the broken piece down, and effect the cure.

to, or produced by, a quantity of callus falling into it from the edges of the broken bone, and that the nearer the broken pieces are brought to each other, the more likely ſuch conſequence is.

Every part of this doctrine ſeems equally abſurd. In the firſt place, the fractured bone is by no means capable of ſupplying ſuch a quantity of callus as to produce this end, unleſs it may be ſuppoſed to run from it as ſolder from a plumber's ladle; in the ſecond place, if this was the caſe, the moſt likely, and indeed the only probable way of preventing the depoſition of ſuch juice, muſt be by bringing the broken pieces into cloſe contact; and in the third place, there is no authority from the appearance of ſuch joints after death, (at leaſt as far as my experience goes) to ſuppoſe this to be the caſe, or to countenance ſuch opinion. The cauſe therefore of this rigidity, which is now and then found to attend the broken patella, muſt be ſought for elſewhere, viz. in the long reſt and confinement of the joint, as a means uſed by many to procure exact union; in miſchief done to the ligament, which is formed by the united tendons of the four ex-

tenſor

tenſor muſcles of the leg, at the time of and by the fracture; and in the nature of the fracture itſelf, that is, the manner in which the bone ſhall happen to be broken.

But, be all this as it may, the fact undoubtedly is, that they walk beſt after ſuch accident, whoſe patella has been broken tranſverſely, and that into two nearly equal fragments; whoſe confinement to the bed has been ſhort, that is, no longer than while the inflammation laſted; whoſe knee, after ſuch period, has been daily and moderately moved; and in whom the broken pieces are not brought into exact contact, but lie at ſome ſmall diſtance from each other.

I cannot take leave of this ſubject of ſimple fractures, without mentioning a circumſtance relative to them, which although, when rightly underſtood, is of little or no importance, yet by being miſunderſtood, becomes frequently of conſiderable conſequence.

I mean, the uſe of the term, *riſing end of a broken bone.*

By the expreſſion, any one unacquainted with theſe things would be inclined to

think, that the prominent part of a broken bone roſe, or was elevated from its natural place, and became by ſuch riſing ſuperior to the other part or extremity of the fracture. This would certainly be the idea of an ignorant perſon, and as ſuch would be of little conſequence; but by the practice of many, who call themſelves ſurgeons, it is as certainly their idea alſo, and this renders it a matter of great conſequence. Many inſtances are producible, in which our conduct is in great meaſure regulated by the language which we uſe. Having no ideas annexed to our words leads us into abſurdity and unintelligibility, but falſe ones influence us ſtill more, and frequently produce very material errors.

The fiſtula lachrymalis, the fiſtula in perinæo, and that in ano, are glaring proofs of this, and my preſent ſubject is full as much ſo: for upon the erroneous idea annexed to the term *riſing end*, ſtands all the abſurd practice of compreſs, bolſter, and ſtrict bandage in the caſes of ſimple fracture *.

The

* I was ſome few years ago carried by a ſurgeon, ſince dead,

The truth is, that there is really no *riſing end* to a broken bone; I mean, when applied, as the term uſually is, to the leg, thigh and clavicle. There is indeed a ſuperior or prominent end or part, and an inferior or depreſſed one, but the former of theſe is in its proper place, from which it cannot by art be moved, and the latter, which is not in its proper place, is very capable by art of being put into it.

Perhaps this may to ſome appear a mere play of words, a nominal diſtinction without a real difference; but when the influence, which a right or wrong idea of this produces on practice is attended to, the conſequence will be obvious and ſerious.

When a collar bone, os femoris, or tibia and fibula are broken, by the action of the muſcles, by the motions of the patient, and by the mere weight of the inferior part of the arm, thigh or leg, the fractured ends of ſuch bones

dead, to ſee a contrivance of his own to keep down the riſing end of a broken tibia. It was ſomewhat upon the principle of Petit's tourniquet, and calculated to act by compreſſion. I told him my opinion freely, but the inventor was wedded to his invention, and the firſt ſimple fracture he applied it to, he thereby converted into a compound one, by preſſing the bone through the ſkin.

bones are diſplaced, and always diſplaced in ſuch manner, that the inequality occaſioned neceſſarily by ſuch diſplacement, proceeds from the inferior end of the fractured bone being retracted or drawn under the ſuperior: this produces a tumefaction or unequal riſing, and the upper extremity of the fracture is therefore called the riſing end of it. Now the man who regards this riſing end, as that part of the fracture which has by ſuch riſing got out of its place, and not as having accidentally become the prominent part merely by the inſinuation or retraction of the other part underneath it, will go to work with bolſter, compreſs and bandage, in order to bring and keep ſuch end down; by which means he will give his patient conſiderable pain, and while he depends on ſuch means alone, will moſt certainly be fruſtrated in his intention and expectation, the means not being adequate to the propoſed end. But the man who looks on this in the true light, that is, who looks on the ſuperior part, as being in its proper place, and the inferior, as being diſplaced by the weight of the limb, and the action of the muſcles, will know, that by the mere poſition of

of ſuch limb, he ſhall be able to remedy all the inconvenience and deformity, as far as they are by art capable of remedy, without the parade, or the fatigue of uſeleſs apparatus.

He will, for example, know that the prominent part of a broken clavicle, that part of it which is next to the ſternum, is juſt where it ſhould be, and that the inferior part, that which is connected with the ſcapula, is out of its place, by being drawn down by the weight of the arm; and therefore inſtead of loading, as is uſual, the prominent part with quantities of compreſs, which never can do any ſervice, he, by a proper elevation of the arm, will bring the lower end upward into contact with the other, and thereby with very little trouble eaſily accompliſh what he never can do in any other manner, however operoſe.

The ſame thing will happen from the ſame principles in the leg and thigh; a prominence, or a riſing end, there always will be, but that riſing end is never to be brought down by any preſſure from compreſs or bandage; the fallen or inferior one muſt always be brought up to it, by the proper poſition of the reſt of the limb:

this will always remove the inequality as far as it is removeable, and nothing elſe can *.

* In a profeſt regular treatiſe on this ſubject, it would be right to take notice of what may be called the infortunia or accidental evils, which ſometimes accompany even ſimple fractures; ſuch are, diſeaſe ariſing from injury done to the medullary membrane, within the bones, in bad habits: hæmorrhage, or a ſpecies of ſpurious aneuriſm, from a wound of the interoſſeal artery, between the tibia and fibula, or of either of the carpal arteries: miſchief from the fracture becoming accidentally the ſeat of the criſis of a fever, deficiency of callus, or the accident of the broken bone not uniting: the fractured limb becoming the ſeat of an eryſipelas, terminating in a ſlough of the common membrane and perioſteum: the gelatinous juice or callus, which ſhould unite the fracture, being in ſo morbid a ſtate, as to produce a kind of caries with exoſtoſis, inſtead of its doing its proper duty, &c. Of all theſe there are examples, but they do not come within the plan which I preſcribed to myſelf when I began theſe papers.

COM-

COMPOUND FRACTURES.

I Uſe the term compound fracture in the ſenſe in which the Engliſh have always uſed it, that is, to imply a broken bone complicated with a wound.

In this kind of caſe the firſt object of conſideration is, whether the preſervation of the fractured limb can, with ſafety to the patient's life, be attempted; or, in other words, whether the probable chance of deſtruction, from the nature and circumſtances of the accident, is not greater than it would be from the operation of amputation. Many things may concur to make this the caſe. The bone or bones being broken into many different pieces, and that for a conſiderable extent, as happens from broad wheels, or other heavy bodies of large ſurface, paſſing over, or falling on ſuch limbs; the ſkin, muſcles, tendons, &c. being ſo torn, lacerated and deſtroyed, as to render

gangrene

gangrene and mortification the moſt probable and moſt immediate conſequence; the extremities of the bones forming a joint being cruſhed, or as it were comminuted, and the ligaments connecting ſuch bones being torn and ſpoiled are, among others, ſufficient reaſons for propoſing and for performing immediate amputation. Reaſons, which (notwithſtanding any thing that may have been ſaid to the contrary) long and reiterated experience has approved, and which are vindicable upon every principle of humanity, or chirurgic knowledge.

When a ſurgeon ſays, that a limb, which has juſt ſuffered a particular kind of compound fracture, ought rather to be immediately cut off, than that any attempt ſhould be made for its preſervation, he does not mean by ſo ſaying, that it is abſolutely impoſſible for ſuch limb to be preſerved at all events; he is not to be ſuppoſed to mean ſo much in general, though ſometimes even that will be obvious; all that he can truly and juſtly mean is, that from the experience of all time it has been found, that the attempts to preſerve limbs ſo circumſtanced, have moſt frequently been fruſtrated by the death of the patients, in conſequence of

ſuch

ſuch injury; and that from the ſame experience it has been found, that the chance of death from amputation is by no means equal to that ariſing from ſuch kind of fracture.

Every man knows, that apparently deſperate caſes are ſometimes cured; and that limbs ſo ſhattered and wounded, as to render amputation the only *probable* means for the preſervation of life, are now and then ſaved. This is an uncontroverted fact, but a fact which proves very little againſt the common opinion; becauſe every man of experience alſo knows, that ſuch eſcapes are very rare, much too rare to admit of being made precedents, and that the majority of ſuch attempts fail *.

This

* The baron Van Swieten, writing as many others have done, that is, theoretically on ſurgery, adviſes us, in the caſe of very bad compound fractures, which may moſt probably require amputation, to defer the operation, until we have tried the force of antiſeptic fomentations and applications of like kind for two or three days; and this opinion and advice he builds, in ſome meaſure, on a remarkable ſucceſs of La Motte, in a ſeemingly deſperate caſe, of a man's leg maſhed by the wheel of a heavy carriage.

That De La Motte's patient eſcaped, I make no doubt, becauſe he has ſaid ſo; but the ſurgeon ſhewed much more raſhneſs in attempting to ſave ſuch a limb, than he would have done in the amputation of it; the operation would

This conſideration relative to amputation is of the more importance, becauſe it moſt frequently requires immediate determination; every minute of delay is in many inſtances to the patient's diſadvantage, and a very ſhort ſpace of time indeed, frequently makes all the difference between probable ſafety and fatality. If theſe caſes in general would admit of deliberation for two or three days, and during that time ſuch circumſtances might be expected to ariſe, as ought neceſſarily to determine the ſurgeon in his conduct, without adding to the patient's hazard, the difference would be conſiderable; the former would not ſeem to be ſo precipitate in his determination, as he is frequently thought to be, and the latter being more convinced of the neceſſity, would

would have been the more juſtifiable practice.—With regard to the baron's advice, to ſtay two or three days, I take the liberty to add, that if you do that, ſtay ſeveral more; for at the end of that time (I mean two or three days) the patient will have very little chance indeed from the operation, much leſs than he would have had at the time of the accident.

I ſhould be very ſorry to be thought a patron or an adviſer of raſhneſs or cruelty; but in what I have here ſaid, I believe I ſhall have every man in the profeſſion, who has either true humanity or ſound judgment founded on experience, on my ſide.

would ſubmit to it with leſs reluctance. But unhappily for both parties, this is ſeldom the caſe; and the firſt opportunity having been neglected or not embraced, we are very frequently denied another. Here therefore the whole exertion of a man's judgment is required, that he may neither raſhly and unneceſſarily deprive his patient of a limb, nor through a falſe tenderneſs or timidity, ſuffer him to periſh, by endeavouring to preſerve ſuch limb. Some degree of addreſs is alſo neceſſary upon ſuch occaſion, in order to convince the patient, that what ſeems to be determined upon haſtily and with precipitation, will not ſafely admit of longer deliberation.

The limb being thought capable of preſervation, the next conſideration is the reduction of the fracture. The eaſe or difficulty attending this depends, not only on the general nature of the caſe, but on the particular diſpoſition of the bone with regard to the wound.

If the bone be not protruded forth, the trouble of reducing, and of placing the fracture in a good poſition, will be much leſs, than if the caſe be otherwiſe; and in the caſe of protruſion or thruſting forth of

the

the bone or bones, the difficulty is always in proportion to the comparative ſize of the wound, through which ſuch bone has paſſed. In a compound fracture of the leg or thigh, it is always the upper part of the broken bone which is thruſt forth. If the fracture be of the tranſverſe kind, and the wound large, a moderate degree of extenſion will in general eaſily reduce it; but if the fracture be oblique, and terminates, as it often does, in a long ſharp point, this point very often makes its way through a wound no larger than juſt to permit ſuch extenſion. In this caſe, the very placing the leg in a ſtraight poſition, in order to make extenſion, obliges the wound or oriſice to gird the bone tight, and makes all that part of it, which is out of ſuch wound, preſs hard on the ſkin of the leg underneath it. In theſe circumſtances, all attempts for reduction in this manner will be found to be impracticable; the more the leg is ſtretched out, the tighter the bone will be begirt by the wound, and the more it will preſs on the ſkin underneath.

Upon this occaſion, it is not very unuſual to have recourſe to the ſaw, and by

that

that means to remove a portion of the protruded bone.

I will not ſay that this is always or abſolutely unneceſſary or wrong, but it moſt certainly is frequently ſo. In ſome few inſtances, and in the caſe of extreme ſharp-pointedneſs of the extremity of the bone, it may be, and undoubtedly is right: but in many inſtances it is totally unneceſſary.

The two moſt proper means of overcoming this difficulty are, change of poſture of the limb, and enlargement of the wound. In many caſes the former of theſe under proper conduct will be found fully ſufficient, and where it fails, the latter ſhould always be made uſe of. Whoever will attend to the effect, which putting the leg or thigh (having a compound fracture and protruded bone) into a ſtraight poſition always produces; that is, to the manner in which the wound in ſuch poſition girds the bone, and to the increaſed difficulty of reduction thereby induced, and will then, by changing the poſture of ſuch limb from an extended one, to one moderately bent, obſerve the alteration thereby made, in both the juſt-mentioned circumſtances, will be ſatisfied of the truth of what I have ſaid,

and

and of the much greater degree of eaſe and practicability of reduction in the bent, than in the extended poſition, that is, in the relaxed, than in the ſtretched ſtate of the muſcles. Reduction being found impracticable, either by extenſion or change of poſture, the obvious and neceſſary remedy for this difficulty is enlargement of the wound. This to ſome practitioners, who have not ſeen much of this buſineſs, appears a diſagreeable circumſtance, and therefore they endeavour to avoid it; but their apprehenſions are in general groundleſs and ill-founded; in enlarging the wound there is neither difficulty nor danger, it is the ſkin only which can require diviſion, and in making ſuch wound there can be no poſſible hazard. It is needleſs to ſay that the diviſion ſhould be ſuch as to render reduction eaſy; or to remind the practitioner, that ſuch enlarged opening may ſerve very good future purpoſes, by making way for the extraction of fragments, and the diſcharge of matter, ſloughs, &c.

If the bone be broken into ſeveral pieces, and any of them be either totally ſeparated, ſo as to lie looſe in the wound, or if they be ſo looſened and detached as to ren-

der

der their union highly improbable, all ſuch pieces ought to be taken away; but they ſhould be removed with all poſſible gentleneſs, without pain, violence or laceration, without the riſque of hæmorrhage, and with as little poking into the wound as poſſible. If the extremities of the bone be broken into ſharp points, which points wound and irritate the ſurrounding parts, they muſt be removed alſo. But the whole of this part of the treatment of a compound fracture ſhould be executed with great caution; and the practitioner ſhould remember, that if the parts ſurrounding the fracture be violated, that is, be torn, irritated, and ſo diſturbed as to excite great pain, high inflammation, &c. it is exactly the ſame thing to the patient and to the event of the caſe, whether ſuch violence be the neceſſary conſequence of the fracture, or of his unneceſſary, and awkward manner of poking into and diſturbing the wound. The great objects of fear and apprehenſion in a compound fracture (that is, in the firſt or early ſtate of it) are, pain, irritation and inflammation; theſe are to be avoided, prevented, and appeaſed by all poſſible means, let every thing elſe be as it may; and al-

though certain things are always recited, as neceſſary to be done, ſuch as removal of fragments of bone, of foreign bodies, &c. &c. &c. yet it is always to be underſtood, that ſuch acts may be performed without prejudicial or great violence, and without adding at all to the riſque or hazard neceſſarily incurred by the diſeaſe.

Reduction of or ſetting a compound fracture is the ſame as in the ſimple, that is, the intention in both is the ſame, viz. by means of a proper degree of extenſion to obtain as apt a poſition of the ends of the fracture with regard to each other, as the nature of the caſe will admit, and thereby to produce as perfect and as ſpeedy union as poſſible.

To repeat in this place what has already been ſaid under the head of extenſion would be tedious and unneceſſary. If the arguments there uſed for making extenſion, with the limb ſo moderately bent as to relax the muſcles, and take off their power of reſiſtance, have any force at all, they muſt have much more, when applied to the preſent caſe: if it be allowed to be found very painful to extend, or to put or keep on the ſtretch, muſcles which are not at all or but

ſlightly

ſlightly wounded, and only liable in ſuch extenſion to be pricked and irritated, it is ſelf-evident that it muſt be much more ſo when the ſame parts are torn and wounded conſiderably; when the ends of the fractured bone have made their way quite through them, divided the ſkin, and laid all open to the acceſs of the air.

Every conſequence which does or may be ſuppoſed to flow from wound, pain or irritation, in conſequence of violence, muſt neceſſarily be much greater, when a lacerated wound, and that made by the bone, is added to the fracture; not to mention the ills ariſing from extending or ſtretching out muſcles already torn or half divided.

One moment's reflection muſt be ſufficient to convince any reaſonable man: but experience is the only proper teſt of all theſe kinds of things. Let this method of treatment then, be fairly and properly ſubjected to it; and if the great advantage of the one over the other does not appear, that is, if the leſs ſenſation of pain by the patient, and the more happy, more perfect, and more expeditious accompliſhment of his purpoſe by the ſurgeon, do not determine greatly in favour of relaxed poſition,

I am, and have for a conſiderable length of time been, greatly miſtaken.

The wound dilated, (if neceſſary) looſe pieces removed, (if there were any) and the fracture reduced, and placed in the beſt poſſible poſition, the next thing to be done is to apply a dreſſing.

On this ſubject a great deal has been ſaid by writers, particularly by ſuch of them as have implicit faith in external applications; but, in order to be able to execute this part of the proceſs properly, a man has only to aſk himſelf, What are the intentions which, by any kind of dreſſing to a compound fracture, he means to aim at the accompliſhment of? And a rational anſwer to this will give him all that he can want to know.

The dreſſing neceſſary in a compound fracture is of two kinds, viz. that for the wound, and that for the limb. By the former, we mean to maintain a proper opening for the eaſy and free diſcharge of gleet, ſloughs, matter, extraneous bodies, or fragments of bone, and this in ſuch manner, and by ſuch means, as ſhall give the leaſt poſſible pain or fatigue, ſhall neither irritate by its qualities, nor oppreſs by its quantity, nor by any means contribute to the deten-

tion or lodgment of what ought to be diſcharged. By the latter, our aim ſhould be the prevention or removal of inflammation, in order, if the habit be good, and all other circumſtances fortunate, that the wound may be healed, by what the ſurgeons call the firſt intention, that is, without ſuppuration or abſceſs; or that not being practicable, that gangrene and mortification, or even very large ſuppuration may be prevented, and ſuch a moderate and kindly degree of it eſtabliſhed, as may beſt ſerve the purpoſe of a cure. The firſt therefore, or the dreſſing for the wound, can conſiſt of nothing better or indeed ſo good, as ſoft dry lint, laid on ſo lightly as juſt to abſorb the ſanies, but neither to diſtend the wound, or be the ſmalleſt impediment or obſtruction to the diſcharge of matter. This lint ſhould be kept clear of the edges, and the whole of it ſhould be covered with a pledgit ſpread with a ſoft eaſy digeſtive. The times of dreſſing muſt be determined by the nature of the caſe; if the diſcharge be ſmall or moderate, once in twenty-four hours will be ſufficient; but if it be large, more frequent dreſſing will be neceſſary, as well to prevent offence, as to remedy the

inconveniences ariſing from a great diſcharge of an irritating ſharp ſanies.

The method of treating the limb, with a view to the prevention of ſuch accidents and ſymptoms, as pain, inflammation, and laceration of parts are likely to produce, is different with different practitioners; ſome uſing from the very firſt, relaxing, greaſy applications, others applying medicines of very different nature. Both theſe may be right conditionally, that is, according to different circumſtances in the caſe, but they cannot be equally ſo in the ſame circumſtances.

Many practitioners are accuſtomed to envelope compound fractures in a ſoft, warm relaxing cataplaſm from the very firſt; whether the limb be in a tenſe ſwollen ſtate or not. This, if I may take the liberty of ſaying ſo, appears to me to be injudicious. When from neglect, from length of time paſſed without aſſiſtance, from miſconduct or drunkenneſs in the patient, from aukwardneſs and unhandineſs in the aſſiſtants, or from any other cauſe a tenſion has taken poſſeſſion of the limb, and it is become tumid, ſwollen and painful, a warm cataplaſm is certainly the beſt and moſt proper application

tion

tion that can be made, and that for very obvious reaſons; the ſtate of the parts under theſe circumſtances is ſuch, that immediate union is impoſſible, and nothing but a free and plentiful ſuppuration can diſſipate or remove impending miſchief: every thing therefore which can tend toward relaxing the tenſe, ſwollen, and irritable ſtate of the parts concerned, muſt neceſſarily be right; the one thing aimed at, (plentiful ſuppuration) cannot be accompliſhed without it. But when the parts are not in this ſtate, the intention ſeems to be very different. To relax ſwollen parts, and to appeaſe pain and irritation by ſuch relaxation, is one thing; to prevent inflammatory defluxion and tumefaction is certainly another; and they ought to be aimed at by very different means. In the former, a large ſuppuration is a neceſſary circumſtance of relief, and the great means of cure; in the latter it is not, and a very moderate degree of it is all that is required. The warm cataplaſm therefore, although it be the beſt application that can be made uſe of in the one caſe, is certainly not ſo proper in the other, as applications of a more diſcutient kind, ſuch as mixtures of ſpirit. vini, vine-

gar and water, with crude ſal ammoniac, ſpirit. Mindereri, acet. litharg. and medicines of this claſs, in whatever form the ſurgeon may chuſe. By theſe, in good habits, in fortunately-circumſtanced caſes, and with the aſſiſtance of what ſhould never be neglected, I mean phlebotomy, and the general antiphlogiſtic regimen, inflammation may ſometimes be kept off, and a cure accompliſhed, without large collections or diſcharges of matter, or that conſiderable degree of ſuppuration, which though neceſſary in ſome caſes, and almoſt unavoidable in others, are and muſt be rather promoted and encouraged than retarded or prevented, by warm relaxing applications of the pultice kind.

Compound fractures in general require to be dreſſed every day, and the wounded parts not admitting the ſmalleſt degree of motion without great pain, perfect quietude becomes as neceſſary as frequent dreſſing.

The common bandage therefore (the roller) has always in this caſe been laid aſide, and what is called the eighteen-tailed bandage ſubſtituted, very judiciouſly, in its place. Of this I have already ſpoken ſo largely, as to make repetition unneceſſary.

Splints,

Splints, that is, ſuch ſhort ones as are moſt commonly made uſe of in ſimple fractures, are by all forbid in the compound, and that for the ſame reaſon which ought to have prevented them from having ever been uſed in the former, viz. becauſe the probable good to be derived from them can be but little, and the probable miſchief is obvious and conſiderable.

But although ſhort ſplints are for many reaſons palpably improper in both caſes, yet thoſe of proper length, thoſe which reach from joint to joint, comprehend them both, and, applied on each ſide of the leg only, are very uſeful both in the ſimple and in the compound fracture, as they may, thus applied, be made to keep the limb, more conſtantly ſteady and quiet, than it can be kept without them.

With regard to poſition of the limb, I have already been ſo explicit, when ſpeaking of the ſimple fracture, that to ſay any thing more about it here would be an abuſe of the reader's time and patience. The only, or the material difference between a ſimple and a compound fracture, as far as relates to this part of the treatment, is, that as the parts ſurrounding the broken

bone

bone in the latter are more injured, and conſequently more liable to irritation, pain, inflammation, and all their conſequences, therefore every method and means, by which the alleviation of ſuch ſymptoms, and the prevention of ſuch conſequences can be obtained, is ſtill more neceſſary and requiſite. Among theſe the poſture of the limb is ſo principal a circumſtance, that without its concurrence every other will be fruitleſs. The points to be aimed at are, the even poſition of the broken parts of the bone, and ſuch diſpoſition of the muſcles ſurrounding them, as is moſt ſuitable to their wounded, lacerated ſtate, as ſhall be leaſt likely to irritate them, by keeping them on the ſtretch, or to produce high inflammation, and at beſt large ſuppuration. Theſe, I ſay, are the ends to be purſued; and how much the poſition of the limb does, and muſt neceſſarily contribute to the advantage or diſadvantage juſt recited, muſt be ſo obvious to any body capable of reflexion, that nothing more need be ſaid about it.

At the beginning of theſe ſheets, I have ſaid, that it was not my intention to write a regular treatiſe, but only to throw out a few hints,

hints, which I hoped might proved uſeful to ſuch as have not yet received better information. The part of my ſubject at which I am now arrived, does not indeed admit of much more: a few general precepts are all which a writer can give; the particular method of conducting each particular caſe, muſt be determined by the nature of that caſe, and by the judgment of the ſurgeon.

Every body knows, or ought to know, that theſe caſes, of all others, require at firſt the moſt rigid obſervance of the antiphlogiſtic regimen; that pain is to be appeaſed and reſt obtained, by anodynes; that inflammation is to be prevented or removed, by free and frequent bleeding, by keeping the body open, and by the adminiſtration of ſuch medicines as are beſt known to ſerve ſuch purpoſes.——And that, during this firſt ſtate or ſtage, the treatment of the limb muſt be calculated, either for the prevention of inflammatory tumefaction, by ſuch applications as are in general known by the title of diſcutients; or, ſuch tumor and tenſion having already taken poſſeſſion of the limb, that warm fomentation, and relaxing and emollient medicines are required.

If

If theſe, according to the particular exigence of the caſe, prove ſucceſsful, the conſequence is, either a quiet eaſy wound, which ſuppurates very moderately, and gives little or no trouble; or a wound, attended at firſt with conſiderable inflammation, and that producing large ſuppuration with great diſcharge and troubleſome formation and lodgment of matter. If on the other hand our attempts do not ſucceed, the conſequence is gangrene and mortification.

Theſe are the three general events or terminations of a compound fracture; and according to theſe muſt the ſurgeon's conduct be regulated.

In the firſt inſtance, he has indeed nothing to do but to avoid doing miſchief, either by his manner of dreſſing, or by diſturbing the limb. Nature let alone will accompliſh her own purpoſe; and art has little more to do than to preſerve the due poſition of the limb, and to take care that the dreſſing applied to the wound proves no impediment.

In the ſecond ſtage, that of formation and lodgment of matter, in conſequence of large ſuppuration, all a ſurgeon's judgment will ſometimes be required in the treatment both

both of the patient and his injured limb. Inlargement of the preſent wound, for the more convenient diſcharge of matter *; new or counter-openings for the ſame purpoſe, or for the extraction of fragments of broken or exfoliated bone, will very frequently be found neceſſary, and muſt be executed. In the doing this, care muſt be taken that what is requiſite be done and no more, and that ſuch requiſite operations be performed with as little diſturbance and pain as poſſible; the manner of doing buſineſs of this kind, will make a very material difference in the ſufferings of the patient.

Very contrary, or at leaſt very different intentions, ſeem to me to require the ſurgeon's very particular attention in the two parts of this ſtage of the diſeaſe.

Previous

* It is a practice with ſome, from a timidity in uſing a knife, to make uſe of bolſters and plaſter-compreſſes for the diſcharge of lodging matter. Where another, or a counter-opening can conveniently and ſafely be made, it is always preferable; the compreſs ſometimes acting diametrically oppoſite to the intention with which it is applied, and contributing to the lodgment by confining the matter; beſide which, it requires a greater degree of preſſure to make it efficacious, than a limb in ſuch circumſtances generally can bear.

Previous to large ſuppuration, or conſiderable collections and lodgments of matter, tumefaction, induration, and high inflammation, attended with pain, irritation, and fever, require evacuation by phlebotomy, an open belly, and antiphlogiſtic remedies, as well as the free uſe of anodynes, and ſuch applications to the limb as may moſt ſerve the purpoſe of relaxation. But the matter having been formed and let out, and the pain, fever, &c. which were ſymptomatic thereof, having diſappeared or ceaſed, the uſe and purpoſe of ſuch medicines and ſuch applications ceaſes alſo, and they ought therefore to be diſcontinued. By evacuation, &c. the patient's ſtrength has neceſſarily (and indeed properly) been reduced; by cataplaſm, &c. the parts have been ſo relaxed as to procure an abatement or ceſſation of inflammation, a ſubſidence of tumefaction, and the eſtabliſhment of a free ſuppuration; but theſe ends once fairly and fully anſwered, another intention ariſes, which regards the ſafety and well-doing of the patient, nearly, if not full as much as the former, which intention will be neceſſarily fruſtrated by purſuing the method hitherto followed. The patient now will require

refection

refection and ſupport, as much as he before ſtood in need of reduction; and the limb, whoſe indurated and inflamed ſtate hitherto required the emollient and relaxing pultice, will now be hurt by ſuch kind of application, and ſtand in need of ſuch as are endued with contrary qualities, or at leaſt ſuch as ſhall not continue to relax. Good light eaſily-digeſted nutriment, and the Peruvian bark, will beſt anſwer the purpoſe of internals; the diſcontinuation of the cataplaſms, and the application of medicines of the corroborating kind, are as neceſſary with regard to externals *.

In ſhort, if there be any rationale in the uſe of the cataplaſm in the firſt ſtage, its impropriety in the ſecond muſt be evident from the ſame principles. So alſo with regard to evacuation, and the antiphlogiſtic regimen,

* It is ſurpriſing how large and how diſagreeable a diſcharge will be made for a conſiderable length of time, in ſome inſtances, from the detenſion and irritation of a ſplinter of bone. If therefore ſuch diſcharge be made, and there be neither ſinus nor lodgment to account for it, and all other circumſtances are favourable, examination ſhould always be made, in order to know whether ſuch cauſe does not exiſt, and if it does, it muſt be gently and carefully removed.

regimen, when all the good propoſed to be obtained by them has been received, a purſuit of the ſame method muſt become injurious, and that for the ſame reaſon why it was before neceſſary and beneficial.

A non-attention to this, has, I believe, been not infrequently the cauſe of the loſs both of limbs and lives.

Every body who is acquainted with ſurgery knows, that in the caſe of bad compound fracture, attended with large ſuppuration, it ſometimes happens, even under the beſt and moſt judicious treatment, that the diſcharge becomes too great for the patient to ſuſtain, and that after all the fatigue, pain and diſcipline, which he has undergone, it becomes neceſſary to compound for life by the loſs of the limb*. This, I ſay, does ſometimes happen under the beſt and moſt rational treatment; but I am

* There is one circumſtance relative to compound fractures, which perhaps may be deemed worth nothing; which is, that I do not remember ever to have ſeen it neceſſary to amputate a limb for a compound fracture, on account of the too great diſcharge, in which the fracture had been united. In all thoſe caſes, where the operation has been found neceſſary on account of the drain, the fracture has always been perfectly looſe and diſunited.

am convinced that it alſo is now and then the conſequence of purſuing the reducing, the antiphlogiſtic, and the relaxing plan too far. I would therefore take the liberty ſeriouſly to adviſe the young practitioner, to attend diligently to his patient's pulſe and general ſtate, as well as to that of his fractured limb and wound; and when he finds all febrile complaint at an end, and all inflammatory tumour and hardneſs gone, that his patient is rather languid than feveriſh, that his pulſe is rather weak and low than hard and full, that his appetite begins to fail, and that he is inclined to ſweat or purge without aſſignable cauſe, and this in conſequence of a large diſcharge of matter from a limb which has ſuffered great inflammation, but which is now become rather ſoft and flabby than hard and tumid, that he will in ſuch circumſtances ſet about the ſupport of his patient, and the ſtrengthening of the diſeaſed limb *totis viribus*; in which I am from experience ſatisfied, he may often be ſucceſsful, where it may not be generally expected that he would. At leaſt he will have the ſatisfaction of having made a rational attempt; and if he is

obliged at laſt to have recourſe to amputation, he will perform it, and his patient will ſubmit to it, with leſs reluctance than if no ſuch trial had been made.

I have ſaid, that a compound fracture either unites and heals as it were by the firſt intention, which is the caſe of ſome of the lucky few, (and was my own ;) or it is attended with high inflammation, multiplied abſceſſes and large ſuppuration, demanding all a ſurgeon's attention and ſkill; and even then ſometimes ending in the loſs of limb, or life, or both; or, that all our attempts prove fruitleſs from the firſt, and gangrene and mortification are the inevitable conſequence of the accident.

The two firſt I have already ſpoken to, the laſt only remains.

Gangrene and mortification are ſometimes the inevitable conſequences of the miſchief done to the limb at the time that the bone is broken; or they are the conſequences of the laceration of parts made by the mere protruſion of the ſaid bone.

They are alſo ſometimes the effect of improper or negligent treatment; of great violence uſed in making extenſion; of irrita-

tion

tion of the wounded parts, by poking after or in removing fragments or ſplinters of bone; of painful dreſſings; of improper diſpoſition of the limb, and of the neglect of phlebotomy, anodynes, evacuation, &c. Any, or all theſe, are capable either of inducing ſuch a ſtate of inflammation as ſhall end in a gangrene, or of permitting the inflammation, neceſſarily attendant upon ſuch accident, to terminate in the ſame event.

When ſuch accident or ſuch diſeaſe is the mere conſequence of the injury done to the limb, either at the time of or by the fracture, it generally makes its appearance very early; in which caſe alſo, its progreſs is generally too rapid for art to check. For theſe reaſons, when the miſchief ſeems to be of ſuch nature as that gangrene and mortification are moſt likely to enſue, no time can be ſpared, and the impending miſchief muſt either be ſubmitted to or prevented by early amputation. I have already ſaid, that a very few hours make all the difference between probable ſafety and deſtruction. If we wait till the diſeaſe has taken poſſeſſion of the limb, even in the

ſmalleſt degree, the operation will ſerve no purpoſe, but that of accelerating the patient's death. If we wait for an apparent alteration in the part, we ſhall have waited until all opportunity of being really ſerviceable is paſt. The diſeaſe takes poſſeſſion of the cellular membrane ſurrounding the large blood veſſels and nerves ſome time before it makes any appearance in the integuments, and will always be found to extend much higher in the former part, than its appearance in the latter ſeems to indicate. I have more than once ſeen the experiment made of amputating, after a gangrene has been begun, but I never ſaw it ſucceed, it has always haſtened the patient's deſtruction.

As far therefore as my experience will enable me to judge, or as I may from thence be permitted to dictate, I would adviſe that ſuch attempt ſhould never be made; but the firſt opportunity having been neglected or not embraced, all the power of the chirurgic art is to be employed in aſſiſting nature to ſeparate the diſeaſed part from the ſound; an attempt which now and then, under particular circumſtances,

has

has proved ſucceſsful, but which is ſo rately ſo, as not to be much depended upon.

If the parts are ſo bruiſed and torn, that the circulation through them is rendered impracticable, or if the gangrene is the immediate effect of ſuch miſchief, the conſequence of omitting amputation, and of attempting to ſave the limb is, as I have already obſerved, moſt frequently very early deſtruction: but if the gangrenous miſchief be not merely and immediately the effect of the wounded ſtate of the parts, but of high inflammation, badneſs of general habit, improper diſpoſition of the limb, &c. it is ſometimes in our power ſo to alleviate, correct, and alter theſe cauſes, as to obtain a truce with the diſeaſe, and a ſeparation of the unſound parts from the ſound. The means whereby to accompliſh this end muſt, in the nature of things, be varied according to the producing cauſes or circumſtances: the ſanguine and bilious muſt be lowered and emptied; the weak and debilitated muſt be aſſiſted by ſuch medicines as will add force to the vis vitæ; and errors in the treatment of the wound or fracture muſt be corrected; but it is evi-

dent to common ſenſe, that for theſe there is no poſſibility of preſcribing any other than very general rules indeed. The nature and circumſtances of each individual caſe muſt determine the practitioner's conduct.

In general, inflammation will require phlebotomy and an open belly, together with the neutral antiphlogiſtic medicines, pain and irritation will ſtand in need of anodynes, and the Peruvian bark, joined in ſome caſes and at ſome times with thoſe of the cooling kind, at others with the cordial, will be found neceſſary and uſeful. So alſo tenſion and induration will point out the uſe of fomentation and warm relaxing cataplaſms, and the moſt ſoft and lenient treatment and dreſſing. But there are two parts of the treatment of this kind of caſe mentioned by the generality of writers, which I cannot think of as they ſeem to have done. One is, the uſe of ſtimulating antiſeptic applications to the wound; the other is, what is commonly called ſcarification of the limb. (Let it be remarked, that I ſpeak of both theſe, as preſcribed and practiſed while the gangrene is forming,

as

as it were, and the parts are by no means mortified.) While the inflammatory tenſion ſubſiſts, alleviation of pain, and relaxation of the wounded and ſwollen parts, in order to obtain a ſuppuration, and conſequently a ſeparation, ſeem to conſtitute the intention, which ought to be purſued upon the moſt rational principles: warm irritating tinctures of myrrh, aloes and euphorbium; mixtures of tinct. myrrh. with mel Ægyptiac. and ſuch kind of medicines, which are found to be frequently ordered, and indeed are frequently uſed, particularly in compound fractures produced by gunſhot, ſeem to me to be very oppoſite to ſuch intention, and very little likely to produce or to contribute to the one thing which ought to be aimed at, I mean the eſtabliſhment of a kindly ſuppuration. I know what is ſaid, in anſwer to this, viz. that ſuch kind of ſtimulus aſſiſts nature in throwing off the diſeaſed parts: but this is a kind of language, which I believe will be found upon examination to have been firſt uſed without any ſufficient or good ground, and to have been echoed ever ſince upon truſt. It had its foundation in the opinion

that gunſhot wounds were poiſonous, and that the mortification in them was the effect of fire, and it has been continued ever ſince, to the great detriment of many a ſufferer. A gunſhot wound, whether with or without fracture, is a wound accompanied with the higheſt degree of contuſion, and with ſome degree of laceration, and every greatly contuſed and lacerated wound requires the ſame kind of treatment which a gunſhot wound does, as far as regards the ſoft parts. The intention in both ought to be to appeaſe pain, irritation, and inflammation, to relax the indurated, and to unload the ſwollen parts, and by ſuch means to procure a kindly ſuppuration, the conſequence of which muſt be, a ſeparation of the diſeaſed parts from the ſound. Now whether this is likely to be beſt and ſooneſt accompliſhed by ſuch dreſſings and ſuch applications as heat and ſtimulate, and render the parts to which they are applied criſp and rigid, may fairly be left to common ſenſe to determine.

Scarification, in the manner and at the time in which it is generally ordered and performed, has never appeared to me to have

have ſerved any one good purpoſe. When the parts are really mortified, inciſions made of ſufficient depth will give diſcharge to a quantity of acrid and offenſive ichor; will let out the confined air, which is the effect of putrefaction, and thereby will contribute to unloading the whole limb; and they will alſo make way for the application of proper dreſſings.—But while a gangrene is impending, that is, while the parts are in the higheſt ſtate of inflammation, what the benefit can be which is ſuppoſed or expected to proceed from ſcratching the ſurface of the ſkin with a lancet, I never could imagine; nor, though I have often ſeen it practiſed, do I remember ever to have ſeen any real benefit from it. If the ſkin be ſtill ſound and of quick ſenſation, the ſcratching it in this ſuperficial manner is painful, and adds to the inflamed ſtate of it; if it be not ſound, but quite altered, ſuch ſuperficial inciſion can do no poſſible ſervice; both the ſanies and the impriſoned air are beneath the membrana adipoſa, and merely ſcratching the ſkin in the ſuperficial manner in which it is generally done, will not reach to, or diſcharge either.

From

From what has been ſaid, it will appear, that there are three points of time, or three ſtages of a bad compound fracture, in which amputation of the limb may be neceſſary and right, and theſe three points of time are ſo limited, that a good deal of the hazard or ſafety of the operation depends on the obſervance or non-obſervance of them.

The firſt is immediately after the accident, before inflammation has taken poſſeſſion of the parts. If this opportunity be neglected or not embraced, the conſequence is either a gangrene or a large ſuppuration with formation and lodgment of matter. If the former of theſe be the caſe, the operation ought never to be thought of, till there is a perfect and abſolute ſeparation of the mortified parts. If the latter, no man can poſſibly propoſe the removal of a limb, until it be found by ſufficient trial, that there is no proſpect of obtaining a cure without, and that by not performing the operation, the patient's ſtrength and life will be exhauſted by the diſcharge. When this becomes the hazard, the ſooner amputation is performed the better. In the firſt inſtance, the operation ought to take place before inflam-

inflammatory miſchief is incurred; in the ſecond, we are to wait for a kind of criſis of ſuch inflammation; in the third, the proportional ſtrength and ſtate of the patient, compared with the diſcharge and the ſtate of the fracture, muſt form our determination.

Of

Of Dislocations in general.

THE principle inculcated ſo frequently in ſome of the foregoing pages, concerning the extended or relaxed, that is, the reſiſtent or non-reſiſtent ſtate of the muſcles, as depending on the poſition of the limb, may be applied with equal truth and equal advantage to diſlocations, as to fractures. Neither of them can indeed be rightly underſtood or judiciouſly treated without ſuch conſideration. In both, a perfect knowledge of the diſpoſition, force, attachments and uſes of the muſcles, at leaſt thoſe of the limbs, are abſolutely and indiſpenſably neceſſary; and if the young ſtudents would be careful in attending to the plain and obvious parts of anatomy; if they would with their own hands diſſect the muſcles, tendons, blood-veſſels and nerves; if they would examine minutely the ſtructure, diſpoſitions and connexions of all the parts

parts which form the various joints, with their ligaments, and attend to the effects which the actions of the muſcles and tendons connected therewith muſt neceſſarily have on them, they would have much more preciſe and adequate ideas of luxations, than many of them have; they would have ideas of their own, not taken upon truſt from writers, who have for ages done little more than copy each other, and they would act with much more ſatisfaction to themſelves.

By what our forefathers have ſaid on the ſubject of luxations, and by the deſcriptions and figures which they have left us of the means they uſed, of what they call their organa and machinemata, it is plain that force was their object, and that whatever purpoſes were aimed at or executed by theſe inſtruments or machines, were aimed at and executed principally by violence.

Many, or moſt of them indeed, are much more calculated to pull a man's joints aſunder, than to ſet them to rights. I will not go ſo far as to ſay, that they are all equally bad or improper; but I will venture to affirm, that hardly any of them are ſo contrived as to execute the purpoſe for which they

they ſhould be uſed, in the manner moſt agreeable, or moſt adapted to the nature or mechaniſm of the parts on which they are to operate, or to accompliſh ſuch purpoſe in the moſt eaſy and moſt practicable manner, and conſequently, as I have already ſaid, they act by force principally.

Nor is that all; ſome of them labour under another defect, and that capable of producing great miſchief; which is, that the force or power of the inſtrument is not always determinable, as to degree, by the operator, and conſequently may do too little or too much, according to different circumſtances in the caſe, or more or leſs caution or raſhneſs in the ſurgeon.

I know very well that many of theſe are now laid aſide, and that ſome few have been ſo altered, as to become uſeful; but ſtill the ſame kind of principle, on which theſe inſtruments were orginally founded and conſtructed, very generally prevails, and violence is uſed, to the great fatigue, pain, and inconvenience of the patient, in many caſes, in which dexterity, joined to a knowledge of the parts, would execute the ſame purpoſe with facility and eaſe.

In

In diſlocations, as in fractures, our great attention ought to be paid to the muſcles belonging to the part affected. Theſe are the moving powers, and by theſe the joints as well as other moveable parts are put into action: while the parts to be moved are in right order and diſpoſition, their actions will be regular and juſt, and generally determinable by the will of the agent, (at leaſt in what are called voluntary motions); but when the ſaid parts are diſturbed from that order and diſpoſition, the action or power of the muſcles does not therefore ceaſe, far from it, they ſtill continue to exert themſelves occaſionally, but inſtead of producing regular motions, at the will of the agent, they pull and diſtort the parts they are attached to, and which by being diſplaced cannot perform the functions for which they were deſigned.

From hence, and from hence principally, ariſe the trouble and difficulty which attend the reduction of luxated joints. The mere bones compoſing the articulations, or the mere connecting ligaments, would in general afford very little oppoſition, and the replacing the diſlocation would require very little trouble or force, was it not for the re-

ſiſtance of the muſcles and tendons attached to and connected with them: for by examining the freſh joints of the human body, we ſhall find that they not only are all moved by muſcles and tendons, but alſo, that although what are called the ligaments of the joints do really connect and hold them together, in ſuch manner as could not well be executed without them, yet, in many inſtances they are, when ſtript of all connection, ſo very weak and lax, and ſo dilatable and diſtractile, that they do little more than connect the bones and retain the ſynovia; and that the ſtrength as well as the motion of the joints, depends in great meaſure on the muſcles and tendons connected with and paſſing over them; and this in thoſe articulations which are deſigned for the greateſt quantity, as well as the celerity of motion. Hence it muſt follow, that as the figure, mobility, action, and ſtrength of the principal joints depend ſo much more on the muſcles and tendons in connexion with them, than on their mere ligaments; that the former are the parts which require our firſt and greateſt regard, theſe being the parts which will neceſſarily oppoſe us in our attempts

for reduction, and whoſe reſiſtance muſt be either eluded or overcome: terms of very different import, and which every practitioner ought to be well appriſed of.

From the ſame examination is to be obtained a kind and degree of very uſeful information, which the ſkeleton cannot afford. I mean an acquaintance with the ligaments themſelves both external and internal, the cartilages both fixed and moveable, and the parts furniſhing what is called the ſynovia.

This to thoſe who are perfectly acquainted with the ſubject, may ſeem too obvious to have needed mention; but no one who has not examined the joints can poſſibly have this kind of neceſſary knowledge, and I am convinced that there are many practitioners who have no idea of articulations, but what the aſſemblage of dry bones has furniſhed them, and which muſt be very inadequate.

I have neither leiſure nor inclination at preſent to enter into this matter minutely, or indeed as it deſerves; beſide which, I have, I fear, ſufficiently exerciſed my reader's patience already in the foregoing ſheets,

I will therefore detain him no longer than while I mention a few leading principles relative to luxations in general, drawn from the ſtructure of the parts concerned, and which appear to me to be applicable, with very little if any variation, to every particular ſpecies.

1. Although a joint may have been luxated by means of conſiderable violence, it does by no means follow, that the ſame degree of violence is neceſſary for its reduction.

2. When a joint has been luxated, at leaſt one of the bones of which it is compoſed is detained in that its unnatural ſituation, by the action of ſome of the muſcular parts in connexion with it; which action, by the immobility of the joint, becomes, as it were, tonic, and is not under the direction of the will of the patient.

3. That the mere burſal ligaments of ſome of the joints endued with great mobility are weak, diſtractile, and conſtantly moiſtened; that for theſe reaſons they are capable of ſuffering conſiderable violence without being lacerated; but that they are alſo ſometimes moſt certainly torn.

4. That

4. That did the laceration of the ſaid ligaments happen much more frequently than I believe it does, yet it cannot be a matter of very great conſequence, as it neither totally prevents reduction, when timely and proper attempted, nor a conſequent cure *,

5. That

* In the accident of a diſlocated tibia, from a broken fibula, the ſtrong, inelaſtic, tendinous ligaments, which faſten the end of the former bone to the aſtragalus and os calcis, are frequently torn; and as theſe by proper care almoſt always do well and recover all their ſtrength, there is the greateſt reaſon to expect, that the more weak, diſtractile ones do the ſame. The only miſchief which ſeems moſt likely to follow from a laceration of the latter is, from an effuſion of the ſynovia; of which, I think I have (in a bad habit) ſeen an inſtance in the joint of the ancle. That the laceration of the burſal ligament of the ſhoulder cannot be a frequent or general impediment to reduction appears to me, from my never having in more than twenty years care of an hoſpital, met with a ſingle inſtance of its impracticability, when attempted in time.

For it can hardly be ſuppoſed, that ſuch kind of accident ſhould never have fallen to my lot, or to the people who have acted under me.

But even if this could be ſuppoſed, I can alſo ſay, that I do not remember impoſſibility of reduction to have

5. That ſuppoſing ſuch accident to be frequent, yet as it is impoſſible to know, with any kind of certainty, whether it has happened or not, or in what part of the ligament, it cannot be admitted as a rule for our conduct, nor ought ſuch mere conjecture to produce any deviation from what we ought to do, were there no ſuch ſuppoſition. Could we know with certainty when and where this had happened, very uſeful information might indeed be drawn from it.

6. That all the force uſed in reducing a luxated bone, be it more or leſs, be it by hands, towels, ligatures or machines, ought always to be applied to the other extremity of the ſaid bone, and as much as poſſible to that only.

In every joint capable of diſlocation, the ſame circumſtance which renders it liable to be diſplaced, is alſo a very conſiderable aſſiſtance in its reduction. I mean the dilatability or diſtractile power of the ligaments, their capacity of giving way when ſtretched or pulled at.

This

happened to any of the other gentlemen of the houſe, under the ſame circumſtances.

This is perhaps the ſtrongeſt argument which can be produced, why all the force made uſe of in reducing a diſlocated joint ſhould be applied to that bone only, and not to the next. By the yielding nature of the ligaments of the luxated joint, reduction is to be accompliſhed. The ligaments of the other articulation, which is not luxated are yielding alſo; and all the force which is applied to the bone below or adjoining, muſt neceſſarily be loſt in the articulation which is not luxated, and can be of little or no ſervice in that which is.

Let this principle be applied to the diſlocation of the joint of the ſhoulder, and it will ſhew us why the ambi, in which the whole arm is tied down, and ſubjected to the extending power of the ſaid inſtrument, is defective, and may be pernicious. Why inſtruments built on the ſame general principle, but in which the fore-arm is not faſtened down, but left at liberty and not ſubjected to the ligature, execute their purpoſe with a great deal leſs force. Why the vulgar but frequently very ſucceſsful method of reducing this joint, by placing the operator's heel in the axilla of the ſupine patient, ſometimes fails, the ſurgeon not

having proper aſſiſtance, and contenting himſelf with pulling at the patient's wriſt only. It will alſo ſhew us, why in the caſe of a luxated os femoris at the joint of the hip, the ſtrength of five or ſix people divided between the joint of the knee and that of the ancle, ſhall be inſufficient, and that of four, nay three of the ſame aſſiſtants ſhall in the ſame caſe prove ſufficient, by being all, and properly applied to the knee and femur only, as I have more than once ſeen.

Many other applications of this principle might be made, but theſe are ſufficient to thoſe who underſtand the principle itſelf and ſee its force.

7. That in the reduction of ſuch joints, as are compoſed of a round head, received into a ſocket, ſuch as thoſe of the ſhoulder and hip, the whole body ſhould be kept as ſteady as poſſible, for the ſame reaſon as in the foregoing.

8. That in order to make uſe of an extending force with all poſſible advantage, and to excite thereby the leaſt pain and inconvenience, it is neceſſary that all parts ſerving to the motion of the diſlocated joint, or in any degree connected with it, be put

into ſuch a ſtate as to give the ſmalleſt poſſible degree of reſiſtance.

This I take to be the firſt and great principle by which a ſurgeon ought to regulate his conduct in reducing luxations. This will ſhew us why a knowledge of all the muſcular and tendinous parts, acting upon, or in connexion with the articulations, is abſolutely neceſſary for him who would do his buſineſs ſcientifically, with ſatisfaction to himſelf or with eaſe to his patient. It will ſhew us, that the mere poſition of the limb below the luxated joint, is what muſt either relax or make tenſe the parts in connexion with that joint, and conſequently that poſture is more than half of the buſineſs. It will ſhew us, why ſometimes the luxated os humeri ſlips in, as it were, of its own accord, by merely changing the poſition of the arm, when very violent attempts, previous to this, have proved ſucceſsleſs. It will ſhew us why extending the arm in a ſtraight line horizontally, or ſo as to make a right angle with the body, muſt in ſome inſtances, render all moderate attempts fruitleſs. Why the method of attempting reduction by the heel in the axilla is ſo often ſucceſsful, notwithſtanding two

very conſiderable diſadvantages under which it labours, viz. part of the force being loſt in the elbow, and the tenſe ſtate of one head of the biceps cubiti. Why the tying down the fore-arm in the common ambi is wrong, for the ſame reaſons. Why the fore-arm ſhould at all times (let the method of reduction be what it may) be bent, viz. becauſe of the reſiſtance of the long head of the biceps in an extended poſture. Why when the os humeri is luxated forward, or ſo that its head lies under the great pectoral muſcle, the carrying the extended arm backward, ſo as to put that muſcle on the ſtretch, renders the reduction very difficult, and why, on the contrary, the bringing the arm forward, ſo as to relax the ſaid muſcle, removes that difficulty, and renders reduction eaſy. Why the reduction of a luxated elbow ſhould always be attempted by bending the ſaid joint. Why, when the inner ancle is diſlocated in conſequence of a fracture of the fibula, it is extremely difficult at all times, and ſometimes impracticable, either to reduce or to keep reduced the ſaid joint, while the leg is in an extended poſture; and why a bent poſture of the leg enables us with eaſe to accompliſh both

thoſe ends. Why in the caſe of diſlocation of the head of the os femoris, (be it in what manner it may) a ſtraight poſition of the leg and thigh will always increaſe the difficulty of reduction; and why that very diſtorted and bent diſpoſition, in which the patient will always place it for his own eaſe, is and muſt be the poſture moſt favourable for reduction; becauſe it is and muſt be that poſture in which the muſcles, moſt likely to make oppoſition, are moſt relaxed and rendered leaſt capable of reſiſtance *.

9. That in the reduction of ſuch joints as conſiſt of a round head, moving in an acetabulum or ſocket, no attempt ought to be made for replacing the ſaid head, until it

* In the attempts for reduction of a luxated hip, there is one circumſtance, which by being overlooked, or not attended to, has more than once rendered every effort vain.

It is uſual and indeed neceſſary to tie down and confine the patient on a bed or table, in order to keep his body firm and ſteady; one part of the bandage or ſtrapping by which he is confined is fixed in the groin, and paſſing over his belly and under his buttock, is faſtened above or rather beyond his head to ſomething immoveable. If this bandage be placed (as I have ſeen it) in the groin on the ſide of the luxated bone, it will prove ſo far from being aſſiſtant, that it will neceſſarily fruſtrate every attempt.

it has by extenſion been brought forth from the place where it is, and nearly to a level with the ſaid ſocket.

This will ſhew us another fault in the common ambi, and why that kind of ambi, which Mr. Freke called his commander, is a much better inſtrument than any of them, or indeed than all; becauſe it is a lever joined to an extenſor; and that capable of being uſed with the arm, in ſuch poſition as to require the leaſt extenſion, and to admit the moſt; beſide which it is graduated, and therefore perfectly under the dominion of the operator.

It will ſhew us, why the old method by the door or ladder, ſometimes produced a fracture of the neck of the ſcapula; as I have ſeen it do in our own time.

Why if a ſufficient degree of extenſion be not made, the towel over the ſurgeon's ſhoulder, and under the patient's axilla, muſt prove an impediment rather than an aſſiſtance, by thruſting the head of the humerus under the neck of the ſcapula, inſtead of directing it into its ſocket.

Why the bar or rolling-pin under the axilla produce the ſame effect.

Why

Why the common method of bending the arm (that is, the os humeri) downward, before ſufficient extenſion has been made, prevents the very thing aimed at; by puſhing the head of the bone under the ſcapula, which the continuation of the extenſion for a few ſeconds only would have carried into its proper place.

I know it is ſaid, that mere extenſion only draws the head of the bone out from the axilla, in which it was lodged, but does not replace it in the acetabulum ſcapulæ. To which I will venture to anſwer, that when the head of the os humeri is drawn forth from the axilla, and brought to a level with the cup of the ſcapula, it muſt be a very great and very unneceſſary addition of extending force, that will or can keep it from going into it. All that the ſurgeon has to do, is to bring it to ſuch level; the muſcles attached to the bone will do the reſt for him, and that whether he will or not.

Indeed if all the rational means and methods for reducing a luxated ſhoulder be examined, they will be found to act upon this principle, however differently this matter may appear to thoſe who have not attend-

ed

ed to it. Even the common ambi ſucceeds by means of the extenſion, which the carrying the arm down with it produces, and not by its lever. That part of the inſtrument, ſo far from helping, is often a conſiderable hindrance, and even ſometimes fruſtrates the operator's intention, by puſhing the head of the bone againſt the ſcapula, before it is ſufficiently drawn out from the axilla.

If it was neceſſary to add any thing in ſupport of this doctrine, I ſhould ſay, that the ſuppoſition of laceration of the burſal ligament, being a circumſtance frequently attending this luxation, and proving an impediment to reduction, is a ſtrong inducement to us to be always attentive to the making ſuch extenſion, it being much more likely that the head of the bone ſhould return back by the ſame rent in the ligament, when ſuch ligament is moderately ſtretched out, than when it may be ſuppoſed to lie wrinkled or in folds.

10. The laſt principle which I ſhall take the liberty to mention, and which I would inculcate very ſeriouſly is, that whatever kind or degree of force may be found neceſſary for the reduction of a luxated joint, that

that ſuch force be employed gradually; that the leſſer degree be always firſt tried, and that it be increaſed gradatim.

Whoever reflects on what is intended by extenſion, what the parts are which reſiſt, and how that reſiſtance may be beſt overcome, will want little argument to induce him to accede to this principle; the advantages deducible from attending to it, and the diſadvantages which may and do follow the neglect of it, are ſo obvious.

They who have not made the experiment will not believe to how great a degree a gradually increaſed extenſion may be carried without any injury to the parts extended; whereas great force, exerted haſtily, is productive of very terrible and very laſting miſchief.

I know that the vis percuſſionis, as it is called, has been recommended, as having been ſucceſsful in ſome difficult luxations; but I have ſeen ſuch bad conſequences from it, that I cannot help bearing my teſtimony againſt it. The extenſile and diſtractile quality of the membranes, muſcles and ligaments, enables them to bear the application of very great force to them, without hurt, if ſuch force be applied gradually,

and

and proper time be allowed for the parts to give way in; but great force, ſuddenly applied, is capable of producing the moſt miſchievous conſequences; and that in many other parts of ſurgery, beſide what relates to luxations.

F I N I S.